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THE METAL INDUSTRY

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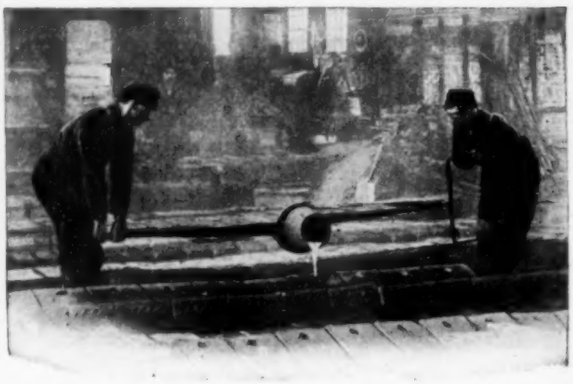

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ELECTRO-PLATERS REVIEW.

OLD SERIES
Vol. 22. No. 8.

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NEW SERIES
Vol. 14. No. 8

THE MANUFACTURE OF SOLDER FROM SCRAP WHITE METALS

SOME INFORMATION FROM A PRACTICAL MAN WRITTEN FOR THE METAL INDUSTRY.

BY C. F. LOEBLE, SMELTER FOREMAN.

SOURCE OF MATERIALS.

The sources for lead are lead pipe, lead foil, cable lead, tea lead, sheet lead and thick lead. The sources for tin are block tin pipe, tin foil and thick tin. The sources for lead and tin are joints, wiping solder and solder recovered from old tin cans. It is important that you make tests of soft sheet and lead pipe, as these materials contain antimony, more or less, and are used for chemical purposes to withstand the action of acids better. The cable lead is practically pure with about 1 to 2 per cent tin, and the tea lead contains also 1 to 2 per cent tin. The block tin pipe is pure, which can be told by the tin cry on bending the pipe, but a variety known as tin lined lead pipe is used to some extent and can be distinguished by no cry on bending; also if the ends are cut the two metals can be distinguished. Tin foil is pure tin rolled, but very often it is bought containing lead foil. The joints are a mixture of tin and lead containing about 12 per cent tin, depending on how close joints are cut, also containing a little antimony. Wiping solder contains about 34 to 40 per cent tin and also contains antimony and the solder from the tin cans also contain about 1 per cent of antimony. The antimony comes from the original wiping solder and from the half and half solder made from drosses and metals containing small amounts of antimony. If the pot used for making babbitt previous to solder has not been thoroughly cleaned out antimony will also be found. In the purchase of such raw materials it is well to draw samples and determine waste in melting also have assay made for antimony and tin contents. This will give you an approximate idea as to what the material will be worth based on the price of new material which is brought below the market, and the price depending also on how much of such material you are in need of.

MELTING AND MIXING.

The mixing of the raw materials consists in melting the heavy materials first, such as lead pipe, cable and sheet lead in kettles holding from one thousand to five thousand pounds. The right heat for the operation is somewhat over the actual melting point of lead, which is 621° F., but below a red heat, which can be told by charring a piece of paper when submerged in the molten metal. Now skim with a perforated ladle then add the lead foil or tea lead and thick lead and submerge under the hot metal so as to melt readily, as this fine material drosses very easily. Then skim again when the pot is filled within 2 or 3 inches of top. Then we have a pot of lead which will have a tendency to run sluggish. This is principally due to the oxide entangled in the metal itself. This thickness is particularly true in the case of metal which is made from scrap as new metal does not thicken as rapidly as scrap material. The usual practice is to introduce a green stick of wood into the kettle and allow the gases which are driven off from the wood to bubble up through the molten metal, which should be below a red heat. There will be considerable dross on top of the metal, and this is readily skimmed off and you now have a metal which will run freely, which can be told by pouring a little metal before and after treatment in a mould. Sometimes a pill of nitrate of lead, about 4 ounces, is very good when introduced wrapped in paper in a phosphorizer. Also mixture of salammoniac 1 part, sulphur ½ part, charcoal 1 part and rosin ½ part will be found very good for removing zinc and other foreign metals. The metals will be clear and flow freely. The metal is now stirred thoroughly and skimmed and a sample drawn for analysis and poured into moulds holding about 100 pounds.

The tin pipe and thick tin are melted and treated in the same manner as the lead, and after stirring and skimming a sample is drawn for analysis for antimony and lead contents. Then pour in the same kind of mould as the lead was poured. Treat the joints the same as described for the lead and tin, drawing a sample for antimony and tin contents. The solder recovered from tin cans is treated the same way as the previous metals, drawing a sample for antimony and tin contents. It is important to keep the antimony at about ½ per cent., for while it does not affect the melting of the joint appreciably, it will affect the running and adhering qualities of the solder. In order to make solder from the refined stock, for a kettle holding 1,000 pounds, weigh off 200 pounds refined lead, 500 pounds recovered solder, 300 pounds tin and melt under a layer of charcoal. When all is melted stir well and draw a sample for analysis for tin and antimony contents which can be obtained in 1 hour if you have a chemist at the plant, then make additions of lead or tin or whatever is necessary. The general practice is to melt the recovered solder, joints and tin pipe, and when the mix is somewhat above actual melting point add the foil when it will melt readily, skim and stir and then skim again if any dross comes to the surface. Heat again and add more foil until kettle is three-fourths full, then make a bullet and test on a Richards solder scale. This scale

is based on the different specific gravities of lead and tin, and must always register 51 to 51½ in order to show 50 per cent. tin by analysis; this difference between analysis and cone test can be readily understood if you will cut a cone lengthwise you will notice the cavities in it. It is impossible to get a good bullet unless your metal is just right. It must be neither too hot nor too cold. The cavities in the cone will cause the difference between cone test and analysis. It is well to check a number of cone tests by analysis which will give you good information in case you are making other mixtures and being guided by the cone test. The drosses obtained in the melting of different metals you will notice has more or less shots of metal through it. It would be well to reclaim this by melting the lead scrap until the kettle is about one-half full, heat quite hot and introduce a few shovelfuls at a time, agitate with perforated ladle, then skim, and you will obtain a fine dross which can be sold upon analysis for the lead and tin contents which it contains.

THE REGULATION OF ELECTROTYPING SOLUTION

SOME INFORMATION RELATING TO THE ART OF ELECTROTYPING.

The Bureau of Standards, Washington, D. C., has issued the second edition of Circular No. 52, which consists of a report of the work of the Bureau in investigating electrotyping solutions.

Although this matter is primarily intended to be of interest to electrotypers, yet inasmuch as the solutions in the electrotyping process consist principally of an acid copper bath, the matter contained in the circular cannot fail to be of interest to electroplaters in general.

As extracts from the results of this investigation have previously been published in THE METAL INDUSTRY, notably articles in January, 1915, and January and March, 1916, it is not thought necessary to repeat them here. The article that appeared in THE METAL INDUSTRY for January, 1915, was a description of the methods recommended by the Bureau for the testing of copper plating solutions and these methods, as now described in the present bulletin, have been amplified and revised and consequently are much more accurate than the methods previously published, although the actual performance of the operation is identical.

An interesting though brief description of the process of electrotyping is given in the beginning of the bulletin and for the benefit of those readers of THE METAL INDUSTRY who are not entirely familiar with the methods we reproduce the matter below.

The first step in the production of an electrotype plate consists in the preparation of an impression in wax of the type form. The molding wax usually consists of ozokerite, to which various substances have been added to produce the desired consistency. The molten wax is poured upon one side of a metallic plate or "case," either lead or copper. After taking the impression of the type form at a slightly elevated temperature by the use of suitable pressure, usually by means of a hydraulic press, the resultant "form" is "trimmed" and "built up" to produce the desired degree of relief in the finished plate.

The form is then coated with graphite, applied either by a wet or a dry process. After washing out the excess of graphite, the form is either introduced directly into the depositing bath, or, in some cases, is given a preliminary treatment (so-called "oxidizing") with copper sulphate and iron filings, whereby a thin film of copper is deposited upon the graphite. The baths are usually contained in lead-lined wooden tanks, with copper crossbars, from which the anodes and cathodes are suspended. Electrical connection to the graphited cathode surface is made by means of the suspending hook by either of two methods. In the first, known as the "case connection," the hook is in direct contact with the metallic case, portions of the wax being removed in order to bring the case and the graphite surface in contact, while the back of the case is insulated with wax. In the second method, known as the "face connection," the hook is in contact with a small copper plate inserted in the wax near the top of the form and in contact with the graphite surface. In the latter method the metallic case itself is not in the circuit, and there is less tendency for copper to deposit upon any accidentally exposed portions of the case.

After the copper is deposited to the desired thickness (usually 0.15 to 0.25 mm., or 0.006 to 0.010 inch) the form is taken from the bath, and the copper "shell" is loosened by means of hot water. After trimming, the back of the shell is treated with soldering fluid (usually zinc chloride) and coated with tin foil, after which it is laid face downward upon a heated pan. After the tin foil is melted upon the back of the shells, molten electrotype metal (usually containing from 3 to 4 per cent. each of tin and antimony and from 92 to 94 per cent. lead) is poured over them. The electrotype plates thus produced are cleaned, cut and trimmed to the desired size and thickness and "finished" to a plane surface, which may be subsequently curved if desired.

In many cases, for halftone or other work in low relief, molding in thin sheet lead at very high pressures is practiced. The lead mold thus produced is usually covered with a very thin film of a wax or oil, and then lightly dusted with graphite to prevent the deposited metal from adhering too tenaciously. The subsequent steps are similar to those involved when wax molds are used.

For fine work, especially color halftones, or for plates requiring very severe service, nickel electrotypes (commonly called "steel" or "nickel steel) are frequently employed. In their preparation, a thin layer of nickel (usually about 0.025 mm. or 0.001 inch) is first deposited upon the wax or lead mold, copper being then deposited back of the nickel, and the resultant nickel-copper shell being treated as above. The true "nickel electrotype" thus made should not be confused with a nickel-plated electrotype in which nickel is deposited upon the surface of a finished copper electrotype, thereby losing some of the detail of the original.

Copies of the Circular No. 52 may be had by applying to the Bureau of Standards, Washington, D. C.

ALUMINUM IN WAR.

Austria and Germany use more aluminum for war purposes than all the other warring nations combined. It has been known, in fact, that Germany has for some years been collecting and storing the metal for war uses. The great majority of the drinking mugs, cans and cups of the German soldiers are made of the light metal. The frames for Zeppelins and the fuses for shells are made from aluminum.

One of the difficulties the Germans have had to face is the shortage of copper necessary for the rings around shells. Many of the German shells are now provided with aluminum rings. Although aluminum does make a substitute, even in cartridges as well as shells and fuses, it is not so good as copper. The French authorities experimented with it some years ago for artillery purposes, but rejected it. The Germans are using it in such large quantities on account of the shortage of copper.

METALS AND GAS*

SOME USES OF GAS IN THE MANUFACTURE OF METAL MUNITIONS IN ENGLAND.

The variety of war purposes which gas is at present serving could not be better summed up than in the following excerpt from an official communication issued by the Director of Factory Construction in the Ministry of Munitions to the manager of every munition factory in the country, strongly urging that, in face of the present need for an increased output of toluol and benzol, and of the shortage of labor, gas should be used as extensively as possible in all munition factories.

PURPOSES FOR WHICH GAS IS BEING USED IN FACTORIES.

As an Illuminant:

For all purposes. Incandescent burners should be employed in all cases.

As a Fuel (Cooking):

For the provision of hot meals for employees.

As a Fuel (Water Heating):

For the provision of hot water for baths and lavatories and for washing purposes generally.

FIG. 1. GROUP OF SHELLS, SHELL PARTS, CARTRIDGES, ETC.

As a Fuel (Warming Purposes):

For heating offices by gas fires, and large rooms by means of gas-heated radiators.

As a Fuel (Manufacturing Processes):

For the following purposes:

Heating copper bands for shrinking or pressing on to shells.

Annealing brass for cartridge making.

Forging, brazing, annealing, hardening and tempering parts of small arms.

Tempering and hardening tools.

Heating of acids or other liquids in vats.

Raising steam in moderate quantities.

Melting and casting all descriptions of metals.

Generally for all purposes involving the use of heat, either by direct application, or through furnace, oven or internal heater.

As a Source of Power:

In all size units up to 1,000 brake horse-power engines and even larger sizes.

To state here in full the reasons why gas is proving so versatile a servant in war work would be to set forth all the numerous advantages of gas as a fuel—and these are already known to readers of the Journal. Among the chief virtues which have commended gas to managers of munition factories are doubtless the following: Saving of space, unequalled range of control, labor-saving effect, and elimination of waste—making for greatly increased efficiency. For example, in annealing processes, where coke or other crude fuels are used, a substantial proportion of scrap is unavoidable, whereas wherever a properly designed gas furnace is employed waste of this kind is reduced to a negligible point.

It is believed that an interesting light will be thrown on some of the excellent work that gas is doing for the war if we give a number of photos illustrating the variety of ways in which gas apparatus made by one single firm alone is serving the needs of the war, and serving it as well as—and in most cases better than—anything other than gas apparatus could do. . . .

The accompanying twoshell diagram, Fig. 2, well repays examination as an index to the pictures which follow, and, indeed, as an epitome of much of the war work which gas apparatus is accomplishing throughout the country. It is difficult to realize that so many operations are required in the turning out of these death-dealing contrivances, and that every one of these operations is being regularly performed by gas apparatus.

The modern shell, whether it be of the shrapnel or of the high explosive variety, is a complex and delicate instrument, which must be made as carefully and timed as accurately as a chronometer. Wanting this accuracy, it may be too dangerous at the beginning of its journey and too safe at the end. It may kill friends; and it may fail to kill foes. A very little distortion, for instance, through

The Uses of Gas in Shell Production.
FUSE CAP.
FUSE PLUG, SOCKET and BODY.
"NOSING-IN" TOP OF SHELL BODY.
LACQUERING INSIDE OF SHELL TO PREVENT CORROSION BY ACIDS IN EXPLOSIVES.
BULLETS IN SHRAPNEL SHELL.
ROSIN TO KEEP BULLETS IN PLACE
COPPER BAND SHRUNK ON TO SHELL BODY,
SOLID BILLETS USED FOR MAKING SHELLS.
THE SHELL BODY
BRASS SHELL-CASE.
IN BORING, TURNING and SHAPING SHELL-BODIES,
Section of Shrapnel Shell.
Section of High-Explosive Shell.

FIG. 2. DIAGRAM SHOWING THE USES OF GAS IN SHELL PRODUCTION.

the merest irregularity in one of the numerous heating processes in its manufacture, or a slight excess of hardness or softness in the encircling copper ring, due to a minute inexactitude in annealing, would affect the direction of the shell and might seriously damage the gun. A very slight flaw in some part of the fuse might mean that the shell would burst too soon, or that it would not burst at all. In respect of its contribution towards the avoidance of such irregularities, gas heating, with its steady uniformity of action and effect, is the obvious perfection of means adapted to ends.

The uses of gas in this connection do not, however, end with the shell—indeed, it may be said that they do not begin with it either. Let the reader picture a vast and splendidly equipped shell manufacturing establish-

*Taken from the Journal of Gas Lighting, London, Eng.

ment, such as the representative factory "Somewhere in Britain," which is shown in Fig. 3—the firm's rotary gas shell furnaces will be seen prominent in the foreground—and let him ask himself what must happen with all the fine high-speed tools that are in use in such a factory, as after regular wear and tear, they from time to time require restoring to working condition.

In the hands of the toolmakers, who may be called the ambulance corps of the army of munitioners, those vast numbers of tools which are rendered temporarily *hors du combat* are, by the use of Wright-Brayshaw high-speed-tool gas furnaces, speedily restored to the ranks of the effectives once more. Indeed, some of the largest makers of munitions in the kingdom have standardized on the firm's high-speed-tool furnaces—just as some gas undertakings do on their gas stoves. These munition makers buy the furnaces from the firm in batches; and they highly value the reliable uniformity and other great conveniences resulting from their standardizing on this one make of apparatus.

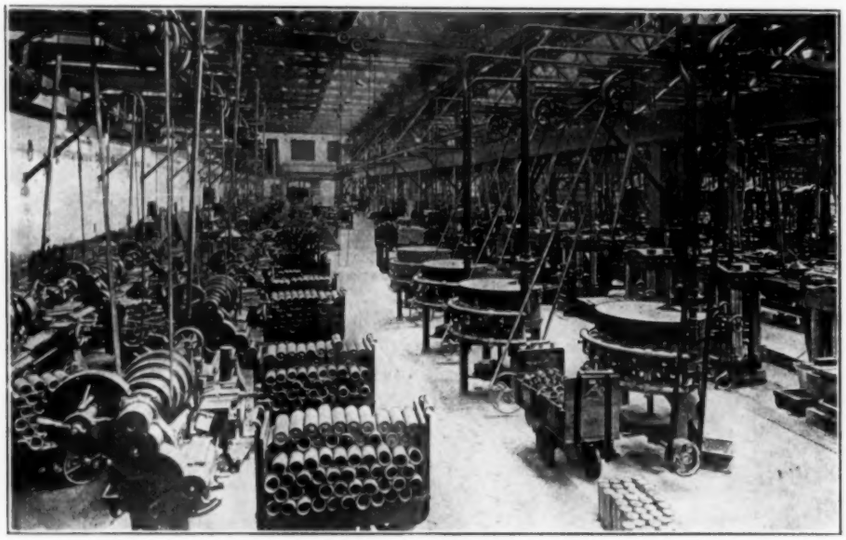


FIG. 3. A BUSY MACHINE SHOP IN A MUNITION FACTORY.

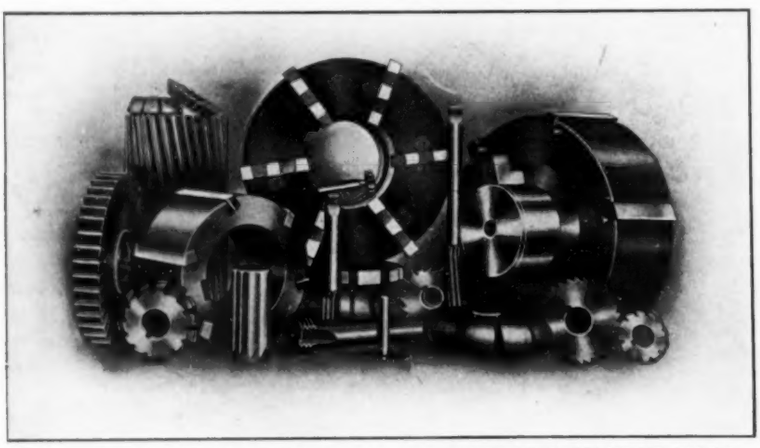


FIG. 4. CUTTERS AND OTHER TOOLS FOR HIGH-SPEED MACHINE WORK.

Fig. 5 illustrates a gas-forging furnace such as is used in the earlier processes in the career of certain classes of tools. In these furnaces, to begin with, the metal of which the tools are to be formed is heated, in order that the preliminary operation of shaping may be carried out.

Coming to brass cartridge cases, the furnaces in which these are annealed are by no means small or light; and it illustrates the huge scale upon which everything in this war is conducted that these furnaces should actually be commonly referred to in dozens. One large munition firm, for example, has fitted up about three dozen of the firm's gas annealing furnaces, specially designed for annealing the cartridge cases for the army service rifle; and with the help of these they are turning out many millions of cartridges every week.

FIG. 5. A GAS-FORGING FURNACE FOR SOME CLASSES OF MUNITION-MAKING TOOLS.

In large munition works it has been found that 6-foot by 4-foot gas furnaces take 33⅓ per cent more cartridge clips (twelve boxes instead of nine) as compared with a coal-fired furnace of similar size. This is due to the uniformity of temperature which the gas furnace maintains. In the coal-fired furnace, owing to what is termed "cold-mouth" of the furnace, the boxes of clips could not be placed within 18 inches of the door—a restriction which is entirely done away with in gas furnaces. These gas furnaces also reduce the time that the clips have to spend in the furnace by a further 33⅓ per cent; so that between these two savings the output is almost doubled. Another point scored by the gas furnaces is that three of them occupy only the same space as one of the coal-fired variety, with its indispensable coal storage space, which is not called for with gas. Hence these munition makers have actually multiplied their output on the same floor space six times over by installing gas furnaces.

Fig. 7 shows pictorially the sixfold economy effected by gas in the treatment of cartridge clips.

Fig. 8 is a photograph showing, in position in the munition works, the gas furnaces which have superseded the coal furnaces in the manner described. These same furnaces are also used for the annealing of sheet brass for munition purposes, as well as for annealing cartridge clips.

In Fig. 9 is shown one of the "Glory-Hole" furnaces, as they are called in munition works, which are supplied for use in connection with the "nosing-in" process as applied to the largest sizes of shells, from the 3.3-inch and 4.5-inch up to the 15-inch. This particular furnace

actually heats, at one charge, four of the huge 15-inch shells which have done so much to maintain the supremacy of the British Navy. The illustration strikingly brings home to one how effectually gas is helping the war at sea as well as on land.

FIG. 6. A BATTERY OF HIGH-SPEED-TOOL GAS FURNACES IN POSITION IN A MUNITION FACTORY.

A "Glory-Hole" furnace used for "nosing-in" smaller shells in munition factories is shown in Fig. 10. The hydraulic press with which the actual "nosing" is done, after the nose of the shell has been heated in the furnace, appears at the left-hand side of the photograph.

Another process in shell manufacture is the lacquering of the interior, in order to prevent the metal being corroded by the chemical action of the explosive materials with which it is filled. The lacquer having been applied, the shells are placed in externally heated gas ovens for drying.

Fig. 11 shows a gas furnace being used for lacquer drying, with four 15-inch shells in the trolley. The presence of the workman indicates how enormous these shells are.

Fig. 12 shows an application of a crucible furnace to shell manufacture, in which fourteen crucible tilting furnaces and a battery of thirty fixed crucible furnaces are installed in one shop in a munition factory, melting white metal for shell fuses. The amount of metal melted by this installation of gas furnaces in a day is over two tons.

FIG. 8. THE GAS-FURNACES THAT HAVE SUPERSEDED THE COAL-FIRED TYPE.

Owing to it being found impossible to get Government permission to reproduce the photograph originally intended for this particular portion of the article, we show an installation of thirty furnaces and fourteen tilting furnaces under one roof, but with an altered background, so as to prevent the surroundings being recognized.

Fig. 13 is a type of gas-heated lead bath which is used for a heating-up process in the manufacture of certain types of shells.

Brass tube of various sizes is naturally in use for an equal variety of purposes in the manufacture of munitions; and for the annealing of these tubes a special gas furnace has been designed, as illustrated in Fig. 14. In order to give absolute uniformity of annealing the entire length of the tube is accommodated.

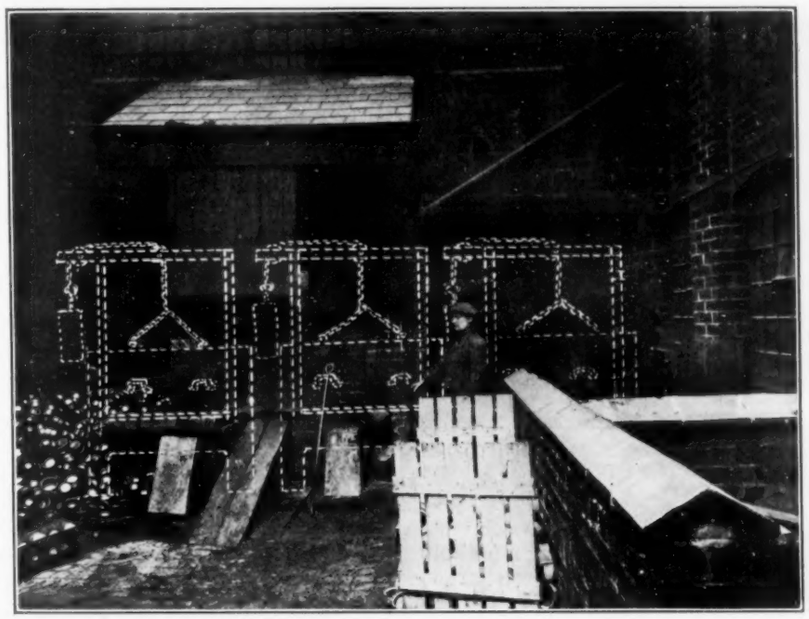


FIG. 7. SHOWING HOW GAS FURNACES DO SIX TIMES THE WORK OF COAL FURNACES.

Fig. 15 shows a gas furnace which has been specially made for tempering the entrenching tools with which certain sections of the Army are now furnished.

War uses of gas furnaces are by no means confined to the manipulation of metals. Furnaces of suitably modified construction have also been furnished to glass manufacturers for processes in connection with glass apparatus for war purposes.

The large machine which is being handled by a workman in Fig. 16 is one of a number which have been supplied for use in chemical works, in connection with the manufacture of explosives for munitions. The apparatus consists of a very large gas-heated vessel (having agitator machinery inside) for the mixing of certain materials connected

with these explosives. There being such a dearth in the labor market at present, work in operating this machine is minimized by its being so constructed as to tilt over to the side for emptying purposes.

It has been remarked that war apparatus has not been confined to the treatment of metals, and, indeed, it is by

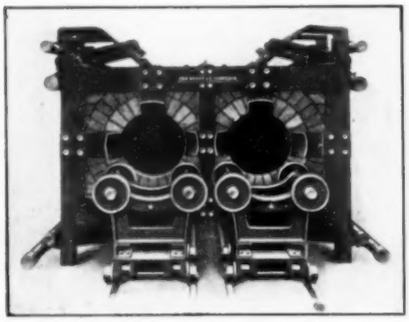


FIG. 9. A "GLORY-HOLE" NOSING GAS FURNACE FOR 15-INCH NAVAL SHELLS.

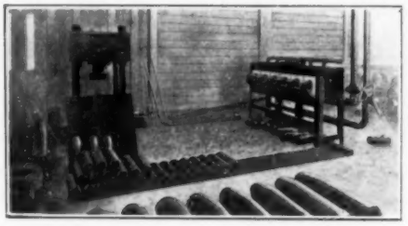


FIG. 10. A SMALLER TYPE OF NOSING GAS FURNACE IN POSITION IN A SHELL FACTORY

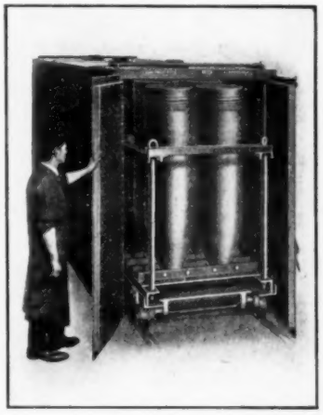


FIG. 11. 15-INCH SHELLS ENTERING THE GAS-HEATED LACQUER DRYING FURNACE

no means limited to facilitating the production of contrivances for damaging the enemy. Apparatus not less effective is also being furnished for promoting the creature comfort of our own soldiers. The sudden convert-

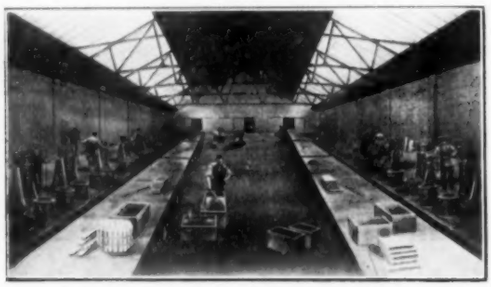


FIG. 12. A BATTERY OF GAS CRUCIBLE FURNACES, 14 TILTING AND 30 FIXED, AS INSTALLED IN A LARGE MUNITION FACTORY.

ing of the whole country into one great arsenal involves the erection of brand new munition factories and the conversion and extension on a large scale of existing factories. For the great concourse of additional workers

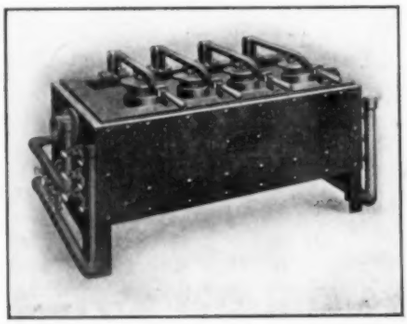


FIG. 13. GAS HEATED LEAD BATH FOR SHELL MANUFACTURE.

with which these vast, newly equipped munition factories are being manned, means have to be improvised for the supply of meals, as in many cases no such arrangements exist. Here, again, the variety of gas-cooking apparatus have been recognized as offering facilities of the most elastic kind for every varying scale of need. While we are dealing with the matter of kitchens, Fig. 18 may also be referred to, as illustrating similar provision for the wants of soldiers in camp, in the shape of a camp kitchen which has been fully fitted up with suitable apparatus.

Recounting on the fingers of one's hand, so to speak,

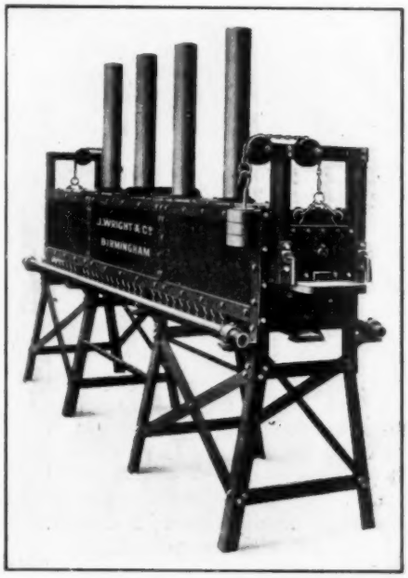


FIG. 14. ANNEALING GAS FURNACE FOR BRASS AND COPPER TUBE.

the salient points of what has been ascertained from a most instructive review of war apparatus, we find that

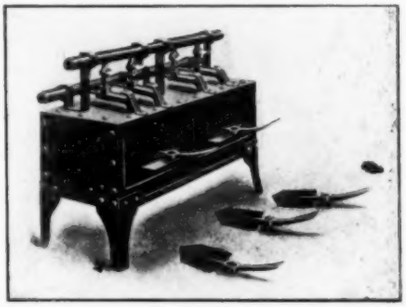


FIG. 15. FURNACE FOR TEMPERING ENTRENCHING TOOLS.

the munition making tools are prepared and repaired by the help of gas furnaces; the shells at nearly every

process are treated by gas furnaces; the rosin and lead for the bullets for filling the shells are melted by gas; the lacquer inside them is dried by gas; trench tools, with which our men "dig themselves in," are tempered by gas; the camps where they live, and the hospitals where they convalesce, are heated by gas; their food is cooked by gas, and the very uniforms they wear are not free from obligation to the all-around utility of the same medium.

In short, whether the material to be treated be mineral or vegetable, or whether, indeed, it be animal in the shape of food, gas is proving itself the best medium.

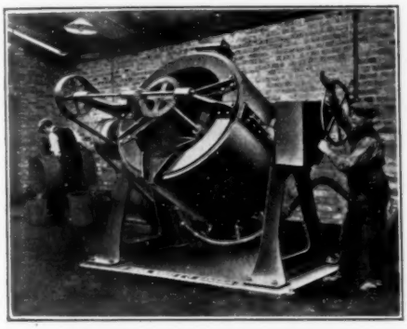


FIG. 16. GAS-HEATED TILTING MIXER FOR EXPLOSIVES

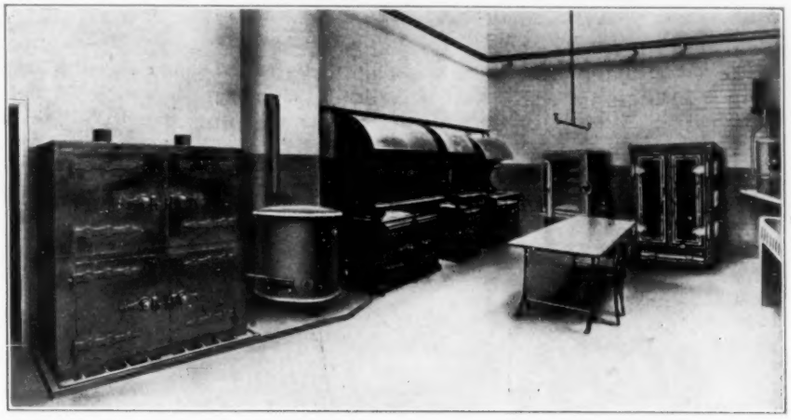


FIG. 17. KITCHEN OF A MUNITION FACTORY WITH GAS APPARATUS THROUGHOUT.

BABBITT METAL MANUFACTURE

The following has been submitted by a prominent firm of metal smelters and manufacturers:

"Genuine babbitt metal is made, as you know, of tin, copper and antimony. As the last two metals take a much higher heat to melt than tin, it is a practice in some quarters to make a hardening alloy of equal parts of copper and antimony. This, of course, does not take as high a heat to melt as copper, and, therefore, simplifies matters when it is mixed with whatever additional quantity of antimony may be needed, together with the tin. Some people, however, who have no crucible for making this hardening alloy, but employ regular iron pots which are used in melting white metals, melt down their tin and then introduce the copper and antimony separately, letting them slowly melt or dissolve in. The same alloy is, of course, produced, but it is a question of ultimate cost. It is, of course, expensive to have the copper and antimony mixture made outside, but then again there is more waste in melting the three metals together in an iron pot as the time is longer. We would like very much to know if you can give us any information on the subject, as to which method others have found to be the cheapest—if there is really much difference. Any difference would, of course, vary with the formula, as some alloys have more copper and antimony than others."

FIG. 18. KITCHEN OF A MILITARY CAMP, ALL THE APPARATUS IN WHICH IS GAS-HEATED.

The Reply

In the manufacture of genuine or A-1 babbitt, the process first described is the one most commonly used. The violet-colored alloy formed by melting together equal amounts of copper and antimony is brittle and may easily be reduced to any desired fineness. Some makers prefer to use a hardening alloy of even lower melting point and they melt together the copper and antimony and a portion of the tin. The resulting alloy is poured into small ingots and these are added to the rest of the tin which has been melted in an iron pot. A greater output of Babbitt per day can be obtained by this method from each kettle than where the copper and antimony are slowly dissolved in the molten tin. If the same number of heat units are applied to the melting in each method there should be no more waste by one method than by the other, and the fuel cost per pound of babbitt made should also be identical by either method in this case.

Where babbitt is made for sale on the open market the question of ultimate cost is the consideration given the most weight in the selection of the process of manufacture, whereas from the user's standpoint the quality of the babbitt is of primary importance. A skilled babbitt maker could, no doubt, make equally good babbitt by either of the two methods under discussion, but where output is to be considered the method of making a hardener of equal parts of copper and antimony or some similar method is to be preferred over the method of directly dissolving the copper and antimony in the molten tin.

The economical production of babbitt of high quality not only requires iron melting pots, but crucible furnaces for making and melting the hardening alloys.—J. L. J.

THE ART OF ENGRAVING AND EMBOSSING

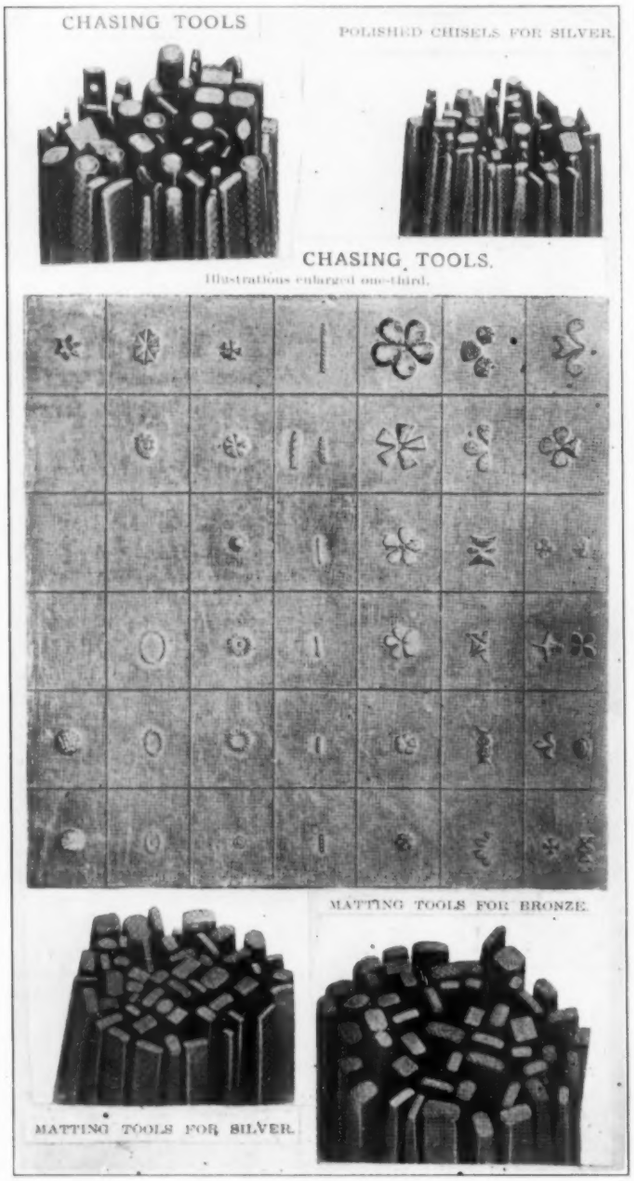
An Exhaustive Article Dealing with the Production of Artistic Effects in Metal Work.

By Easy Way.

(Continued from April.)

Tools.

The hammers and mallets for the engraver and embosser are about the same, the hammers being generally made of a light steel faced head hung on a springy but strong handle. If the handle is flattened the hammer will rebound straight away without the least jar to the hand and wrist, but at the same time resting the forefinger of the hand as a guide on the upper part of the handle and its thick oval end resting in the palm an accurate blow can be struck with



SOME FORMS OF ENGRAVERS' TOOLS.

the least exertion. Some embossers prefer mallets because they give, for the same weight, more striking surface and are not so liable to slip and miss the aim. Also the mallet is preferable when flattening all distorted metals.

That a comparison of embossed and engraved work and the tools required for small articles may be understood, plainly numerous sketches will aid and illustrate, but it must be understood that a person may be highly skilled in engraving without having a particle of the taste or talent requisite for artistic repoussé work. However great the natural talent may be it is three parts wasted if it be fettered by clumsy fingers, and those who suffer from this defect should endeavor to overcome and correct it because this class of work is unlike purely manual pursuits which can be mastered by any one possesing a fair amount of the intelligence and mechanical skill, as it demands in addition to these qualities a certain "feeling" or in other words talent. This feeling, however, is obviously impossible to teach, as the germ must, at least to some degree, be innate in the artist, but much may be done in the way of fostering and encouraging it as great skill and power to execute important work cannot be derived from observation or indeed from tuition of any kind. They must depend almost entirely on the workman's ability and application.

The tools used by engravers and embossers consist, for the most part, of punches, chisels and gravers of different shape and sizes. The number of tools required by professionals for one piece of work varies in proportion to the elaboratenes of the article to be finished. Many of these tools vary only in size and sweep of cutting edge with curves or sweeps in each size graduated between a semi-circle to a curve almost flat, and it is a good plan to learn the uses of a few tools before acquiring a complete set as by this means, when difficulties are felt in the execution of work, a tool of known description is sought for and produced with a foreknowledge of its advantages. This is the surest way to gain a distinct knowledge of the varieties of each kind of tool and its application to the different purposes of design. The various tools most needful, though few in number, should be selected with caution and judgment, the quality far outweighing the quantity. These words of caution are deemed necessary as it is by no means uncommon for the amateur set to be more pleasing in appearance than to be more workmanlike tools, and in comparison they are often rough looking but the quality is generally better and the original cost little, if any, greater.

All the tools required at first are what are known as straights, but most all varieties are, however, made in both bent and curved form. The object of these tools is to allow of their edges cutting or forcing in places which could not be reached with the straight tools. The form of the ready made handles for the gravers are egg and mushroom shaped with a section cut away and should be of some hard wood capable of being made very smooth, for otherwise the palm of the hand would be liable to be galled by the constant friction and pressure. This is rather important and should be borne in mind, for the very best engraver could hardly fail to turn out bad work when wincing under a blistered hand, and nothing is so certain to cause this as an ill-made or rough handle. Some artists, with numerous gravers at hand for convenience, have various woods and colors so that each may be known at a glance. It has also been found

convenient to have a number or any special mark branded on the handle where flattened to denote the size. By this method no time is lost in searching for any particular implement which certainly would be the case if they were all alike without any means of distinguishing them. All these little features, trivial and hardly worth noticing though they may seem, are nevertheless, as long experience has taught, of very material assistance.

One of the most important branches of the art is a knowledge of the proper methods employed in sharpening the tools used, as sharp tools solve the mystery of clean cutting and good work. Care should be taken that the edges of the tools do not knock or rub against one another. Some artists roll their cutting tools within the folds of slightly oiled cloth, having one layer of cloth between each tool. Sharpening the tools is to the artisan what threading a needle is to the seamstress, a continual annoyance, yet not without its advantages, as it breaks in on a continual abstraction in work. Tools must be of good quality and very sharp. Many that are brittle at first at the edge improve after this edge has worn away. It is necessary, while cutting with the same tool continuously, to touch it up on the hone quite often, and if it should take a fit and will not cut, the best thing to do is to lay it down and give it a rest, because it is simply tired. This may seem curious, but is practical and is explained as follows: The steel consists of very minute particles which, though separate in themselves, are very cohesive. These particles, owing to the constant strain, get moved slightly out of place and cause the cutting edge to become blunt, but if laid aside for a time the steel will return to its normal condition. This feature applies to all cutting implements produced in steel and can be detected very readily in a razor which, when refusing to cut freely, if it is laid away to rest it will return to its former keen edge and cut perfectly if its edge is flexible; which can be determined by passing the blade sidewise over the flat of the thumb nail. Laying a tool away to rest also eliminates grinding away the tired portion and a loss of time.

After the tools have been ground and have had the first dull or wire edge removed they should be set or whet on an oil stone, which gives them a greater keenness and then stropped on a piece of leather or the smooth surface of a pine board. The best stones for this purpose are known as Arkansas and Turkey stones, which are slightly hard, as a soft one is practically useless. In order to preserve the good quality of a stone it should be treated as carefully as the sharpest cutting instrument. They should never be allowed to get clogged with dirty dried oil, dust and grit, and while in use they should never be kept without oil because the stone improves in quality as the oil penetrates into it.

One way in which to mount an oil stone (see Fig. —) is so that it can be covered to protect it while not in use To the trained eye it is very distressing to see oil stones worn hollow in the center like a sway-hacked horse, and to remedy this evil the sketch will be found self-explanatory. The pieces of hard wood at both ends and flush with the top of the stone permits the workman, when sharpening the tools, to whet over the ends of the stone as well as in the middle of it, thereby keeping it straight. Naturally, after severe usage, hollow places will show, then in order to restore its eveness take a sheet of medium sand paper or emery cloth, lay it on a flat board well chalked, then turn the stone face down and a brisk rubbing will soon even and straighten the surface. The chalk will prevent the cloth or paper from slipping on the wood. A strop, for convenience, should accompany the oil stone and should be fastened on the top or cover of the stone. An ordinary razor strop glued fast is very suitable.

Other appliances used in connection with repoussé and engraving art are sand bags of sheep skin, chucks, clamps, jeweler's loop, fret saw dividers, whirl drill, etching board, plate press, heating table and a stool of convenient height to accompany a rigid work table fixed firmly against the wall right under a glazed or ribbed glass window with the light from the north. All these conveniences automatically assist the artist to do good work and more readily utilize an "inspiration" when the surroundings are cheerful.

After describing, by illustration, the different appliances just mentioned, the other accessories will be presented of the art, so beautiful and excellent in itself that it often is regarded in the light of a stepping stone to greater things.

(To be continued.)

REMOVAL OF FIRE COAT FROM GOLD.

By Charles H. Proctor.

The removal of the fire coat or green, as it is commonly termed, by the usual acid pickles, consisting of aqua regia, hydrochloric or chromic acids, is oftentimes very unsatisfactory on account of the roughened or sanded appearance after pickling, especially in filigree or raised settings on rings, bracelets or other trinkets. It is therefore desirable to use a solution that will leave the articles as bright and clear as possible. The following method has proved very satisfactory. Some prominent manufacturers in New York City claim it is the best method they have ever used. To produce the results mentioned first prepare a solution consisting of the following:

Cyanide of copper	1½	ozs. by weight
Ammonia, 26 per cent	4	ozs. by measure
Carbonate of soda	4	ozs.
Cyanide of potassium	6	ozs.
Water	1	gal.

Use the solution cold or slightly warm. The bath is used with a reversed current, so that the polarity is just the opposite to plating. The cathode should be a sheet of soft copper and should entirely surround the jar, if one is used, and be connected with the negative pole. The center pole should be the positive. Placing the articles on small frames or sufficiently heavy copper wire connected to the positive pole and moving to and fro rapidly, with a strong current, will leave the articles bright instead of dull as a result of acid pickles.

PRODUCTION OF GOLD AND SILVER IN THE UNITED STATES.

The Bureau of the Mint and the Geological Survey have issued the following joint statement as to the final figures on the production of gold and silver in the United States during the calendar year 1915:

Gold, fine ounces, 4,887,605 valued at $101,035,700 and silver fine ounces, 74,961,075 ounces valued at $37,397,300. The average price of silver per fine ounce for the calendar year 1915 was $0.49889. These figures compare with the production of 1914—$94,531,800 in gold, and 72,455,100 fine ounces of silver, being a gain in the gold production of $6,503,900 and 2,505,975 fine ounces in the silver product.

ADDITION AGENTS IN THE ELECTRO-DEPOSITION OF SILVER FROM SILVER NITRATE SOLUTIONS*

AN ARTICLE OF INTEREST TO ALL ELECTRO-PLATERS OF SILVER

BY FRANK C. MATHERS AND JOHN R. KUEBLER†

AIM AND RESULT OF THIS INVESTIGATION

The aim of this research was to study the action of addition agents in restraining the characteristic, loosely-adherent, crystalline structure of silver electro-deposited from silver nitrate solutions and, if possible, to discover a method of depositing solid, smooth and adherent silver cathodes.

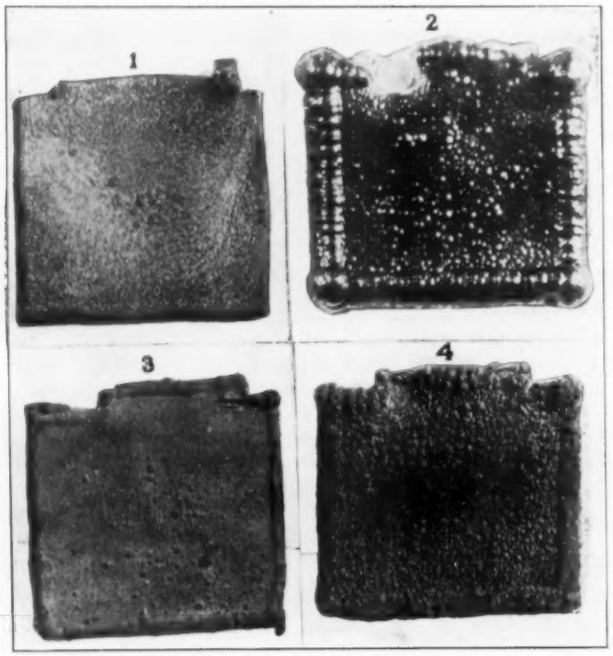


FIG. 1. SOME SILVER DEPOSITS SHOWING RESULTS OBTAINED WITH ADDITION AGENTS.

The ordinary addition agents such as glue, peptone, clove oil, aloin, etc., were found to be either without appreciable effect or to prevent only partially the formation of crystals and in no case was a thick, smooth deposit obtained.

Tartaric acid was far superior to anything else that was tested. A bath containing three per cent. each of silver as nitrate, nitric acid and tartaric acid gave a smooth, hard and entirely adherent silver cathode.

By the simultaneous addition of 0.01 per cent. of glue every twelve hours, the amount of tartaric acid could be reduced to about 0.4 per cent.

MANIPULATION

Small beakers containing 100 cc. of the electrolyte were used as electrolyzing vessels. The electrolyte contained 3 per cent. of silver as silver nitrate and 3 per cent. of free nitric acid. Square pieces of pure sheet silver about 0.2 mm. in thickness and having a total area of 25 sq. cm. were used as cathodes. Anodes, also of pure silver, were melted in cupels with a blast lamp and a hole was made in each one by a small piece of wood which was thrust through the center of the molten silver. Two anodes, suspended by platinum wires, were suspended in each beaker. A current density of 0.8 amp. per sq. dec. (7.4 amp. per sq. ft.) was used. Each bath was continuously but gently stirred by a slow current of air bubbles from a glass tube which was drawn to a capillary at the end in the bottom of the bath.

ADDITION AGENTS OF THE USUAL CLASS

Some of the addition agents such as clove oil, peptone and pyrogallol are oxidized by the free nitric acid with the formation of colored solutions whereby the action of the material is probably changed.

Glue, 0.02 to 0.04 per cent., greatly lessened the crystalline structure. The projecting crystals upon the edges and at irregular places on the faces were fairly adherent. With increasing quantities of glue, vertical striations formed and finally with 0.26 per cent., a spongy deposit was produced.

Peptone (0.04 per cent. was best) gave a striated, finely crystalline deposit of a white color but with projecting, crystalline edges. The deposit was better than the one with glue. An excess of either glue or peptone made the deposits spongy.

Gum Arabic slightly lessened the tendency to form crystals, but aloin and clove oil seemed to be practically without effect.

Pyrogallol and tannin, 0.05 per cent,. each produced a fluffy, voluminous, tinsel-like deposit which was easily shaken from the starting sheet.

The almost total failure to obtain smooth deposits with the above addition agents which are so successful with other metals, indicated the importance of trying unusual classes of addition substances.

INORGANIC ADDITIONS TO THE BATH

Orthophosphoric acid, 1 to 10 per cent. in baths containing 1 to 3 per cent. nitric acid, did not materially reduce the tendency to form crystalline deposits but in some cases the deposits seemed more adherent. Without free nitric acid, spongy deposits were obtained with the higher concentrations of the orthophosphoric acid.

Metaphosphoric acid, 1 to 2 per cent. and no free nitric acid, gave hard, firm, apparently non-crystalline, vertically striated deposits of a brownish color. Addition of nitric acid made the deposits slightly crystalline in appearance and of a white color. One per cent. of metophosphoric acid and 3 per cent. of nitric acid seemed best. These baths gradually deteriorated, the deposits becoming more loosely crystalline. Except for this difficulty, this type of bath might be made satisfactory. See Fig. 1, No. 1.

Boric acid produced no improvement.

The addition of 2 per cent. of the nitrates of ammonium, sodium, potassium, barium, strontium, calcium or magnesium, or 10 per cent. of the nitrates of sodium, calcium or strontium produced no beneficial results.

ORGANIC ACIDS IN THE BATH

One per cent. of oxalic acid and 3 to 10 per cent. of nitric acid (the increased nitric acid was to redissolve the precipitate of silver oxalate) gave a spongy deposit. With 0.006 per cent. of oxalic acid and 3 per cent. of nitric acid no precipitate was formed in the bath but the deposit, which was finely crystalline and smooth in the beginning, gradually formed crystalline projections.

Succinic acid gave about the same results as the oxalic.

*A paper presented at the Twenty-ninth General Meeting of the American Electrochemical Society, held at Washington, D. C., April 27-29, 1916.

†Indiana University, Bloomington, Ind.

Lactic acid, 1 to 5 per cent., and nitric acid, 1 to 3 per cent., gave crystalline deposits. The higher the percentage of lactic acid, the smoother were the deposits. These deposits seemed as rough and coherent as those with the glue alone.

Picric acid, 0.5 per cent., gave spongy deposits.

Tannic acid in small quantities gave loose, tinsel-like crystals. Larger amounts of tannic acid (0.5 per cent.) with 1 per cent. of nitric acid gave spongy deposits.

Citric acid, 3 per cent., gave firm, dark, lustrous deposits which were free from any indications of loose crystals. The effect was similar to that with tartaric acid except that the latter was more permanent and showed less tendency to make the deposits spongy.

Tartaric acid was the best addition agent found.

TARTARIC ACID AS AN ADDITION AGENT

Concentration of the Baths.—Three per cent. of silver as nitrate was chosen because the commercial refining baths have about this concentration. The increase in the concentration of the silver to 6 per cent. very much improved the deposits, which became smoother especially on the edges. Increased cost would be the only objection to this higher concentration of silver.

The higher the per cent. of nitric acid (0 to 1 per cent.), the more pronounced was the crystalline structure when low concentrations of tartaric acid (0.2 to 1 per cent.) were used. Continuous electrolysis of baths low in nitric acid (a few drops to 0.5 per cent.) finally produced poorly adhering deposits. This trouble could be avoided by adding more nitric acid at intervals. Three per cent. of nitric acid, the quantity used in most of these experiments, was chosen in order to avoid the necessity of making these repeated additions. If a lower concentration of nitric acid had been chosen and maintained, a lower per cent. of tartaric acid would have given as good deposits as the higher per cent. which was used in these experiments.

Deposits from baths with the tartaric acid varying from 0.1 to 8 per cent. were at first equally good as regards smoothness and firmness. The color varied from a light grey to a dark grey as the quantity of tartaric acid was increased. As electrolysis progressed this color gradually faded, becoming pure white in those baths containing the smaller amounts of tartaric acid and lighter grey or even merely slightly purplish in spots in those baths having the larger quantities of tartaric acid. The length of time the cathodes remained smooth and free from rough crystalline projections was directly proportional to the quantity of tartaric acid present. See Fig. 1, No. 4. Three per cent. of tartaric acid was considered best; the greater smoothness produced by the larger quantities was not deemed sufficient to warrant the additional cost.

Use of Crude Cream of Tartar.—Crude argols cannot be added directly to the baths on account of the large quantity of insoluble matter and the aqueous extract cannot be used because it contains substances which produce sponginess. However, the crude potassium bitartrate, obtained by crystallization of the aqueous extract from argols, gave as good deposits as refined tartaric acid except that they were a little rougher.

Effect of Temperature.—Increase in temperature increased the formation of crystals. The deposit at 50° C. from a bath containing 3 per cent. tartaric acid, was as crystalline as the deposit from a bath with 0.5 per cent. tartaric acid at room temperature (23° C.). In the beginning a darker, smoother, more shining deposit was obtained at 13° C. than at room temperature, but the final cathode did not seem to be materially better.

Current Density.—An increase in current density to 1.6 amp. per sq. dec. (14.8 amp. per sq. ft.) caused the cathode to become much rougher, some of the projections being easily broken off.

Firm, comparatively smooth deposits were obtained with higher currents from vigorously stirred solutions or from baths containing a higher per cent. of silver.

EFFECT OF IMPURE ANODES.

Use of Impure Anodes.—The use of anodes containing base metals, as lead, copper, zinc, etc., causes a decrease in the concentration of silver in the bath because the amount of silver deposited upon the cathode is equivalent to the total quantity of metals dissolved from the anode of which only a portion is silver. With a 3 per cent. silver solution and 900 fine anodes, between 5 and 6 ampere hours per 100 cc. of solution practically exhausts the silver in the electrolyte providing none of the base metals are deposited. To avoid this difficulty, silver nitrate must be added at intervals in sufficient quantity to maintain the desired concentration. Observing this precaution with a bath containing 6 per cent. silver as nitrate, and 900 fine anodes, a cathode weighing 175 grams was deposited from a 100 cc. bath. The cathode was exceptionally smooth and was free from irregular projecting places on the edges. At the end of the electrolysis, the bath contained 16 per cent. of base metals as calculated from the weight of anodes dissolved. In commercial refining, baths are discarded or purfied when the impurities reach 4 per cent. in some systems or 8 per cent. in others.

EFFECT OF INORGANIC SUBSTANCES.

Effect of Inorganic Substances in Baths Containing Tartaric Acid.—The deposits were made less firm and less solid by sodium or magnesium nitrate, more rough by copper nitrate, less rough by lead nitrate and were unchanged by zinc nitrate. These nitrates of the heavy metals showed such a small influence upon the deposits that other conditions might have been responsible for the small variations noted.

Ferric nitrate (2 per cent.) made the deposit very much smoother and darker in color. The smoothest cathode obtained in the work was from a bath containing 6 per cent. of silver, 3 per cent. of tartaric acid, 3 per cent. of nitric acid and 2 per cent. of ferric nitrate. The cathode looked and felt like a piece of polished, dark metal. Chromium and aluminum nitrates did not show this same action. See Fig. 1, No. 2.

Sulphuric acid (0.5 per cent) seemed to partly neutralize the effect of the tartaric acid. The deposit was as crystalline as if a much smaller quantity of tartaric acid had been used.

Metaphosphoric acid did not improve the deposits but it had an action as shown by the striations.

EFFECT OF ORGANIC SUBSTANCES.

Organic Addition Agents in the Baths Containing Tartrates.—Aloin and clove oil seemed without effect. B-naphthol made the deposit non-adherent.

Peptone (0.04 per cent. with 0.25 per cent. tartaric acid) gave a smooth, brownish colored, glistening deposit in the beginning, but the deposit gradually became less firm and finally become spongy.

The addition of 0.02 per cent. of glue twice daily caused the deposit to have a dark, shining, metallic appearance in the beginning but this metallic luster gradually changed to a mat surface. When 0.046 per cent. of glue had been added the deposit became partly spongy. This is the usual result when an excess of organic matter is present. The use of glue is recom-

mended on account of the greater smoothness which it produces.

Good deposits were obtained by the addition of small amounts of glue to baths containing less than 3 per cent. of the tartaric acid. A firm but slightly rough deposit was obtained from a bath containing 0.25 per cent. of tartaric acid to which 0.01 per cent. of glue was added twice daily. After 56 grams of silver per 100 cc. of the bath had been deposited, some crystalline projections formed, an indication of the exhaustion of the tartaric acid. A firm, comparatively smooth deposit, weighing about 100 grams per 100 cc. of bath, was obtained from a bath containing 0.5 per cent. of tartaric acid to which 0.01 per cent. of glue was added twice daily. It was necessary to add more tartaric acid to this bath before another smooth deposit could be produced. The exhaustion of the tartaric acid was shown by the crystalline structure and the white color of the deposit which, however, was still tough and adherent.

A smoother deposit was obtained from the baths containing the glue and the smaller amounts of tartaric acid by using only 0.5 per cent. of nitric acid. More nitric acid should be added when the bath becomes dark colored. See Fig. 1, No. 3.

Cost of the Addition Agents.—With tartaric acid at 30 cents per pound and glue at 20 cents per pound[1], the cost of these addition agents is 0.17 cent per pound (0.37 cent per kilo) of silver deposited. This assumes that 0.5 per cent. of tartaric acid and a total of 0.1 per cent. of glue are required and that only 100 gms. of silver are deposited from each 100 cc. of electrolyte. With 900 fine anodes, the bath would then contain over 8 per cent. base metal impurities and would have to be purified or discarded. The cost at present prices would be 0.23 cent per pound. These prices are for purified tartaric acid, whereas a crude cream of tartar gives satisfactory results.

[1] List prices before the war.

Vigorous Stirring of the Baths.—A current of 2.4 amp. per sq. dec. (22.2 amp. per sq. ft.) was used in baths which were vigorously stirred with rotating glass stirrers. The edges of the cathodes became thick and projected somewhat, but this was almost prevented by increasing the concentration of the silver to 6 per cent. However, smoother, more shiny deposits were obtained by using 0.08 per cent. of glue (added in four portions) and 0.5 per cent. of tartaric acid. A somewhat smoother deposit was obtained by using greater quantities of tartaric acid.

Properties of the Deposited Silver.—a. Color. The dark, shiny color which was always noted in the beginning of each electrolysis gradually changed to white, except in the presence of ferric nitrate or repeated additions of glue in which cases the dark color persisted to the end.

b. Smoothness. In all cases the deposits became less smooth as electrolysis progressed. Ferric nitrate aided materially in maintaining the initial smoothness.

c. Hardness and structure. The deposits were hard but brittle. Cathodes only 0.5 cm. thick could not be broken by the hands but cracked into many pieces when struck with a hammer. Pieces from some of the cathodes showed distinct strata.

d. Occluded material and specific gravity. When heated, the cathodes swelled, becoming a fourth larger in some cases, and the deposited silver crumbled from the starting sheet, giving a great number of small, loose pieces of silver, if the temperature was kept below the melting point of silver. An odor of burning tartaric acid could be detected in some cases and if the deposit was dark, grey or shiny, the coloration disappeared and the mass assumed a silver white color.

(To be continued.)

ALUMINUM DIE CASTINGS.

A manufacturing firm says: "We are using No. 12 alloy aluminum, which we understand is the best mixture for casting work. Inasmuch as the castings used are for tool work, we desire a very good finish and we are more or less troubled with blow-holes and poor surfaces for polishing.

"We have tried different temperatures in the melt and quite a number of different temperatures in a crucible at time of pouring. We have also experimented quite largely in regard to the proper gating of patterns and while we have considerably improved the quality of work we can still see chances for improvement in the quality.

"Our foundry foreman has visited other foundries where considerable of this kind of work is done, but the work is not exactly parallel to ours as regards the finished casting. For this reason, the writer assumes that there has not been the necessity for a clean surface that we would require."

THE REPLY.

If your castings do not have to be machined all over but simply have to be polished, you will probably find aluminum die castings satisfactory. These castings are made in steel molds on air machines, using a pressure of about 200 pounds. The castings are usually very perfect on the outside but under the skin there are invariably numerous small blow-holes. If your castings are of such a shape or are wanted in such small lots or from such a variety of patterns that it is not feasible to make steel molds for them, the use of sand molds is the only alternative. Blow-holes in sand cast aluminum may be due to any one of a number of causes.

Aluminum is a light metal, and hence a higher gate is desirable in molding than is necessary for brass or copper. Otherwise, the molten aluminum is unable to drive out any steam that forms in the mold because of sand that is too wet or any gases that have been dissolved during melting. A sand that packs too closely or is full of clay is a common cause of blow-holes in aluminum castings. An open sand should be used. It should be worked as dry as possible and the molds and cores should be well vented.

Ramming molds too hard will often cause blow-holes, as the sand is so compacted that it becomes more or less impermeable to steam and gases. Light ramming should not, however, be carried to such a point that the sand washes or that the molds swell and make overweight castings. Careful melting is the best means of avoiding trouble from occluded gases in the molten metal, but it may be found advantageous to use a deoxidizer at times, and aluminum vanadium has been found very satisfactory. About ½ of 1 per cent. is recommended. Horn gates allow the metal to enter the mold with the least disturbance and generous risers give a good opportunity for entangled air or gases to escape.—J. L. J.

SPELTER

A Report Made by the Subcommittee of Committee B-2 on Specifications for Non-Ferrous Metals. The Report Was Read at the Symposium on Non-Ferrous Metals and Alloys Held June 29, 1916, at the Atlantic City, N. J., Meeting of the American Society for Testing Materials.

By G. C. Stone, W. H. Bassett and W. B. Price.

Grades and Uses.

Spelter, like all commercial metal, contains impurities but unlike most other metals, none of these impurities are advantageous for any of the purposes for which it is used. The effects of these impurities on different products made from it vary greatly, hence the necessity for several grades differing in purity.

Spelter is used for the following purposes, in quantities in the order mentioned: galvanizing, alloys, rolling, ornamental castings and miscellaneous uses.

For ordinary galvanizing the effect of the common impurities is not very great. Iron is objectionable as causing a loss in dross and in making the coating more brittle and liable to crack and peel off. Lead, up to the limit found in commercial spelter, has no serious effect, but is objectionable when present in large quantity as it liquates in the bath and does not enter the coating and is, therefore, wasted. Lead is usually worth less than zinc and the purchaser does not wish to pay for it at zinc prices.

The four higher grades of spelter are chiefly used for alloys and the specifications were principally made for the alloy makers and do not, in all cases, call for metal suitable for some of the other purposes for which it is used.

In alloys, aluminum is frequently very injurious, 0.01% in many cases making brass useless for the purposes for which it is intended. In the few instances where its presence is desired, it is more satisfactory to add it directly than as a constituent of the spelter. The specifications, therefore, require that the four higher grades of spelter shall be entirely free from aluminum.

Iron is always present in spelter, but is very undesirable in brass and similar alloys, making them harder and greatly increasing the hardness due to cold working. The increased hardness is very objectionable, causing a greater consumption of power and endangering the rolling mills and drawing presses.

Lead is very objectionable in some alloys and essential in others and the main variation in the different grades of spelter is in the allowable amount of lead. High Grade spelter which is used for alloys that are to be subjected to the most severe spinning and drawing operations, can be rejected if it contains over 0.07% of lead, as lead reduces the ductility of brass.

Intermediate spelter, with a lead limit of 0.20%, is used for alloys that do not have to undergo as severe treatment, and also very largely for alloys like manganese bronze that are used both cast and wrought.

Brass Special has a lead limit of 0.60% and is mainly used for brasses where the maximum ductility is not required. The lead and iron are limited to 0.60% and 0.03% respectively, because brass made from such spelter is used for ordinary drawing, spinning and forming work where the requirements are not especially severe.

Selected spelter carrying the maximum 0.80% of lead and 0.04% iron is used by brass manufacturers for making alloys to which lead is added in order to secure free cutting qualities. Material of this kind is usually made into rods and heavy sheets for the manufacturing of small articles by turning, milling and drilling operations. Such brass must contain sufficient lead to reduce the strength of the material and cause the chips to break easily.

Owing to the fact that brass is usually made in crucibles in small quantities, uniformity in the spelter is of the greatest importance. As lead segregates badly, and more markedly the higher the proportion, the lead limit of the average sample is made low enough to allow for this tendency without injurious effect on the product. Even when the brass manufacturer adds lead, he does so in known amounts and this obtains a uniform alloy from the different pots, which would not be possible if all the lead needed were contained in the spelter.

Cadmium.

There is very little doubt but that cadmium in zinc is very injurious for some of the purposes for which it is used, as it renders it harder and much more brittle. There is, however, considerable difference of opinion as to how far these undesirable properties persist in alloys made from zinc containing cadmium. The majority of the brass makers are of the opinion that the high temperature of the brass pots cause so much of the cadmium to volatilize that the residual amount has very little deleterious effect.

There is no doubt but that large amounts of cadmium, say 1 or 2%, make brass hard and brittle. We have no reliable information at present showing the effect of small amounts of cadmium on the alloys, and the evidence on this point is extremely conflicting.

Cadmium, together with lead, seems to intensify the effect of the latter and also causes the brass to become more sensitive to the effect of overheating in the various annealing operations to which the wrought material is subjected.

Very little spelter is made containing as much cadmium as is allowed for Intermediate and Brass Special and the specifications, therefore, put practically no limit on cadmium except for High Grade. Whatever the facts may be for alloys, it is certain that the amounts of cadmium allowed by the specifications are much greater than are permissible for other purposes for which zinc is used. The question of cadmium in the better grades is complicated by the fact that until the last year and a half practically all the High Grade and most of the Intermediate spelter was made by one company from ores that are free from cadmium. The alloy makers have, therefore, had no extended experience with the effect of cadmium in the better grades of spelter, and during the last eighteen months conditions have been so abnormal that it is difficult to draw conclusions.

High Grade spelter is very extensively used for galvanizing telegraph and telephone wires which are required to stand sharp bending when making the "lineman's splice;" as it has been found that if impure spelter is used, the coating cracks and peels off the joint. The only High Grade spelter that has been used for this purpose is entirely free from cadmium. Cadmium being the element most likely to cause this trouble, it is very doubtful whether metal containing as much as is allowed by the specifications (0.05%) would be suitable for this purpose.

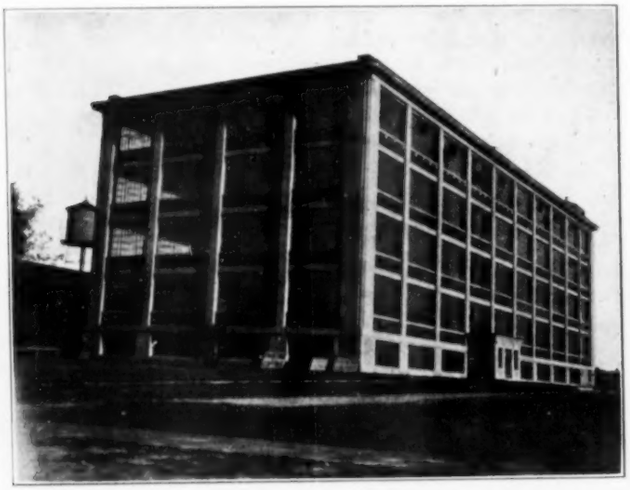
THE NEW HOME OF THE BUFFALO METER COMPANY

A Graphic Illustration of the Growth of a Prosperous Metal Firm.

By George W. Grupp.

Starting in a humble way in 1892, in a small building on Washington street, the Buffalo Meter Company, of Buffalo, N. Y., manufacturers of water and oil meters of all sizes, have grown until today they are one of the largest industrial establishments in Buffalo and one of the largest manufacturers of meters in the United States.

Their new home, which is a fireproof concrete steel structure, is located on a 10-acre plot of ground on the north side of Buffalo. It is within easy shipping facilities by either the D., L. & W. or Erie Railroad. In fact, they have 1,000 feet of private switching trackage. The



1—PLANT OF THE BUFFALO METER COMPANY, BUFFALO, N. Y.

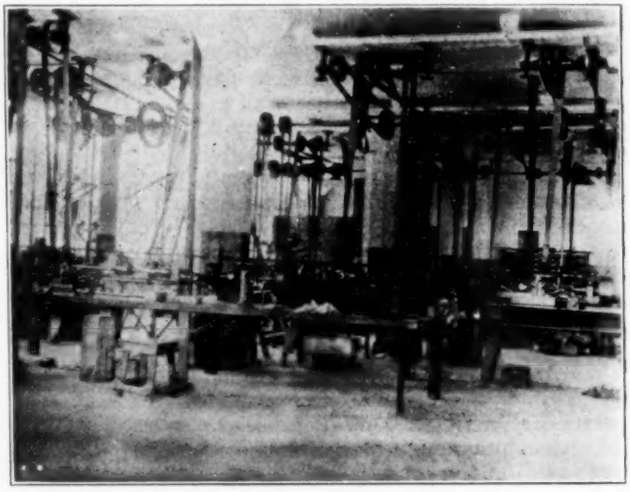
building itself, which is 82 x 200 feet and four stories high, is surrounded with a beautiful lawn and a sprinkling of flower beds and trees. This building has two acres of floor space. All of its floors, walls and ceilings are

2—A PART OF THE FOUNDRY.

made of concrete. All of its doors, window casings, partitions, etc., are made of steel. It is equipped with a private telephone system of 24 telephones, which are located in different parts of the building. It has three electrically-operated elevators—two freight and one passenger. The building is heated by steam.

The building is unusually well lighted both by artificial and natural means. Looking at the building from the exterior one would think it made up entirely of windows. To get the greatest possible amount of natural light all interior walls, ceilings and columns throughout the building have been whitewashed. On dark days, when their large and powerful electric lights are brought into play, the building is equally as bright and cheery.

As this building was very carefully planned each floor represents a particular step in the process of constructing their meters. In other words, their product begins as a crude article on the fourth floor and ends up on the first floor ready to be packed for shipment. The idea is accomplished in this wise. All raw material after it reaches the plant is stored in the basement, which is also the home of their garage and heating plant. When the raw material is needed it is taken to the fourth floor in two 10-ton capacity freight elevators. Upon reaching the fourth floor it is then wheeled to temporary storage bins, which are partitioned off by steel sheeting. It is on this floor that the foundry, which is equipped with



3—PART OF THE MACHINE SHOP.

three very large gas furnaces, moulding benches and machines and cleaning room, is located. The small plating room is also located on this floor. On the floor below, after the product has left the foundry, all parts are carefully machined in their large machine shop before they are sent to the second floor to be assembled. Once the meters have been assembled they are sent to the first floor. On this floor they are either stored on their one mile of steel shelving or immediately packed and shipped. The general offices are also located on this floor.

The machinery throughout the building is operated by electric motors. One motor is sometimes obliged to run several machines off a line shaft.

For the comfort and welfare of their employees the company has equipped each floor with a lavatory and a very large locker and wash room. Great Bear Spring water and fountains are located in every department of the building. On the fourth floor a number of shower baths have been installed. And last, on the roof, a very spacious rest room, which is beautifully fitted out, has been provided for the men's comfort.

PREVENTIVE MEASURES AGAINST SPOTTING OUT

AN EXHAUSTIVE ARTICLE WHICH IS THE LAST WORD IN THIS ANNOYING PROBLEM

WRITTEN FOR THE METAL INDUSTRY by FRED OTTMAN, FOREMAN PLATER.

(Concluded from June.)

The only question left is: Can we force enough metallic salt solution into the cavities to completely precipitate all the cyanide? The writer has good reason to doubt this. He experimented along this line some years ago. He had a wider scope in view for the process than merely bind the cyanide; he aimed at a method which would apply to all cases, regardless of what substance the cavities may contain, so that it could be used by any plater and under all circumstances. The first step was to substitute a known substance for the uncertain. Water, of course, would have been the best substitute if we only knew when to stop; one cavity is larger, one solution more concentrate than the others requires longer treatment, etc. A dilute solution of sulphuric acid, "sour water," was selected instead and forced into the cavities by alternate heating of the samples in boiling water and immersion into the cold acid. As the latter acts both by flushing and chemical reaction, the exchange requires fewer operations than mere flushing with plain water. Later experiments would then establish the maximum concentration of the acid permissible in order to obtain the most benefit from the chemical exchange without restricting the flushing effect, should the method prove practicable. Sulphuric acid is a very active acid of a strong combining power and able to displace all the other acids commonly met in the plating room, in their salts, even nitric and hydrochloric, setting them free for evaporation, and while the acid itself very eagerly absorbs any moisture within its reach, the salts, sulphates, are usually dry and harmless and may remain in the cavities. But here is the same difficulty again. One cavity may already contain an excess of acid, while another, larger one, may not yet be half finished. We had, therefore, to go to the limit, continue the treatment till it was certain that all the pores contained nothing but sulphuric acid and water. The acid, of course, could not remain, but it could easily be precipitated by a solution of an alkaline earth metal, —barium hydrate, for instance—which would form with the acid nothing but barium sulphate, a substance analogous to gypsum and even less soluble than the latter, and water as the only by-product. The block of barium sulphate in the hole would not only be absolutely harmless, but also have the further advantage of barring any solution with which the article afterwards may come into contact. The scheme worked very well, too well. The first immersion into the barium solution already filled in the holes, as could be plainly seen under a good magnifying glass. The subsequent immersion into hot water forced the plugs out of the apertures and nearly 1/32 in. above the surface, so they could be still more plainly seen and without the glass, but they did not come off. The next cold plunge merely forced them in place again, and the next heat out; but all communication with the interior was shut off. By a slow heat, the interned moisture could be evaporated through the plugs without moving the same, but when they afterwards were saturated with lacquer and made superficially air-tight, the expanding air blew them out just the same when the articles were heated in the lacquer kiln. The precipitate naturally forms first where the two solutions meet, in the narrow entrance channels, and there the passage, as we already know, is difficult enough even for liquids; the formation of a solid body in these gateways is not desirable, even if the connection between the single particles is less rigid than in the case of this experiment.

The mishap reminded the writer of the forgotten lesson from an earlier experience. He had been called upon to devise ways for dyeing coarse sawdust which was to be used in concrete tiles and floorings, partly on account of its physical properties and partly for decorative purposes. The problem seemed easy enough. Substantive dyes which combine directly with the wood fibre were not plentiful; adjective dyestuffs had to be resorted to and fixed upon the wood with suitable mordants. Samples were soon ready which stood every test for fastness of color. When they were put to use, the tiles scraped and pulished, and thus the interior of the chips exposed, it was found undyed where a mordant had been used. The process was reversed, the dye solution applied first and then fixed with the mordant. The colors ran wherever a particle was cut open. Either solution, alone, was found to absolutely penetrate the thickest particles of wood; but as soon as any one had been applied, the second one set with it at the first point of contact, the surface of the wood particles, and the precipitated dye, infinitely much finer than any precipitate here in question, absolutely blocked the further progress of the second solution. Other means had to he employed to hold the dyes in the wood without rendering them insoluble. The recollection of this incident did not encourage further experiments with combatting spotting by complete precipitation.

If we can convert the obnoxious substance into a sparingly soluble saltof a weak acid, a compound which owing to these characteristics neither has any tendency to form new combinations with other substances it is in contact with, or with the metal harboring it, nor attracts moisture or effloresces, which readily gives up the water in which it is dissolved and dries out to stay dry, we have much better chances for complete and permanent success. Compounds of this kind we have in the tartrates.

If we make concentrate solutions, cold saturated, of tartaric acid and of cyanide, and mix a few drops of each solution together, we notice crystals appearing almost immediately, accompanied by the odor of escaping hydrocyanic acid gas, and in a few moments we have a dry and solid cake of salt instead of a solution, and we will find that it requires many times the combined volume of the two solutions mixed, in additional water, in order to completely redissolve this new salt, a tartrate or acid tartrate of the alkali of the cyanide. Solutions of carbonates and hydrates (caustic) of the alkalies give the same results with tartaric acid; with potassium particularly the latter is so eager to combine, that it forms this crystalline precipitate with almost any potassium salt. The heavy metals also form sparingly soluble tartrates; but if we would attempt to precipitate copper, for instance, from a strong solution of sulphate or nitrate of copper in this manner, we would fail. The tartaric acid is too weak to displace the nitric or sulphuric acid; the two solutions merely mix. Not even the chloride of sodium will react with tartaric acid for the same reason. Carbonate and hydrate of copper, however, or their solution in ammonia or ammonium carbonate, drop the pale green crystalline copper tartrate in contact with tartaric acid solution, or form it, if added dry, to the acid solution. If we add the tartaric acid solution to a strong solution of copper in cyanide, a plating bath, we also obtain a dry cake of salt with the evolution of hydrocyanic acid gas. If we redissolve the salt in enough water, we find two separate compounds, an alkali tartrate in solution and a white precipi-

tate of cuprous cyanide, which is insoluble in the alkali-tartrate solution and only difficultly converted into copper tartrate by long continued warm digestion with an excess of the tartaric acid. Practically, it will always remain in the cavities as an insoluble cyanide. Whether it will block the entrance to the cavities like the barium sulphate, or leave the passage open, will largely depend upon the relative proportion of metal and alkalies in the substance to be treated. In most cases we will have to deal with an abundance of alkali salts not only from the plating solution but also from earlier operations, lyes, plain cyanide, etc., and the tartaric acid may have a chance to slip by and act in the interior. The insoluble part of the residue, the metallic cyanide, will be less than one half of what we would obtain by precipitating the solution with a metallic salt. The latter would bind all the hydrocyanic acid present in the free cyanide and in the alkali cyanide of the double salt, in addition to the metallic cyanide already at hand in the double salt; the tartaric acid, as we have seen, liberates all the hydrocyanic acid not bound to a metal as a gas, which escapes. In any case, the tartaric acid solution will be helpful in dealing with the alkalies, the foremost supporters of spotting, in any form they are found in the plating room and with alkaline plating solutions in most cases. Sulphates of copper and nickel hardly make any trouble; the small quantities of free sulphuric acid these solutions contain may rather be helpful in neutralizing some of the lye present in the cavities from earlier operations; otherwise it can be neutralized by one immersion of the heated articles into a cold solution of ordinary washing soda. Boric acid, citric acid, their salts and phosphates, sulphites, etc., are harmless. Magnesium salts, should they make trouble and not respond to the tartaric acid treatment, can be precipitated by sodium phosphate, but only when their solution is alkaline, and the reaction is rather slow. Other cases are best cured by flushing with clean cold water alternating with heating in boiling water.

Tartaric acid when cold, as its solution has to be used, does not attack the metal during the short immersions. We referred, for the experiment, to concentrate solutions, but merely for demonstrative purposes, in order to make the great difference in solubility between the original substances and the resulting tartrates more apparent; for practical use they would be a failure, as a solid block of salt forming where the two solutions meet, that is in the inlets to the cavities, would be just as obstructive as the barium sulphate plugs proved to be. A solution of a few per cent. of tartaric acid in water is all that is required, and as the aqueous solution of this acid soon undergoes destructive decomposition, no stock solution must be made, only as much dissolved as immediately needed, and the solution frequently tested for its acidity with litmus paper. The dry crystals of the acid keep infinitely.

Acetic acid has also been recommended for the same purpose, instead of tartaric, even by authorities like Langbein. Writer must confess he has never cared to even try this "remedy." Acetates, as a rule, are highly deliquescent and ideal supporters of spotting. What benefit can be expected from substituting one pernicious substance for some other one?

Electro-deposited metal does not usually close in over cracks and other small apertures. Writer tried an intermediate layer of tin from a solution made up without the use of cyanide, and by drawing this soft metal over the cracks on the scratch wheel produced a closed surface for the subsequent ultimate deposit. As samples, castings were selected that had been discarded as incurable spotters, relieved of the obnoxious contents by thorough flushing of the cavities, repolished, and treated as afore mentioned. Few spots recurred and these, upon breaking the pieces, were found to result from nests of dross, for which there is no cure. The result was rather gratifying. Writer, however, was inclined to ascribe the success mainly to his preventive measures in treating the work. To prove his contention that the same results can be accomplished without the tin-bath and in the ordinary solutions, more samples of the same defective character were secured, stripped of the old deposit, flushed and repolished. An alkaline copper solution was made up without the use of cyanide and the samples divided into two lots, without purpose, just as they came under the hands. One lot was handed to the regular brass plater to prepare the pieces for the plating tank in his wont way, then they were plated in the special solution, which contained neither cyanide nor other notoriously harmful substances; they spotted. The other lot the writer himself ran through exactly the same solutions the plater had used, hot lye and a cold solution of cyanide to take off the tarnish. He did not even "neutralize" these solutions in sour water, nor rinse off the cyanide, as the work had to go back to a cyanide solution again. . He took the articles directly from the cyanide to the warm regular cyanide plating solution and plated them there, rinsed them just in plain water and dried them. They did not spot, although they were kept unlacquered in the plating room for several months during the hottest season. The only precautions the writer had taken were to rinse the hot lye and the warm cyanide plating solution off in *hot* water and to cool off the hot articles, after the first rinsing, in clear cold water before immersing them into the cold cyanide to take off the tarnish; very little trouble compared with the time saved by avoiding an extra cure.

Casual cracks or single disfiguring blow holes are advantageously soldered up before the plating or tightly plugged with a piece of the same alloy.

(The end.)

EXPORTATION OF ANTIMONY FROM CHINA.

The Commerce Report states that the export of antimony from China, and particularly through the port of Shanghai, has become an important feature since the outbreak of war in Europe. During the past few months as high as $90 per ton has been paid for the prompt forwarding of antimony from Shanghai to the United States, and according to invoices certified at the American consulate general at this place shipments valued at $919,957 were sent to the American market during 1915, compared with $2,434 worth for 1914. The principal antimony-producing provinces are Hunan, Kwangsi, Kwangtung, Yunnan and Kweichow.

The first smelters for the reduction of antimony, so far as is known, were established in 1907, when the Tai Shing Mining Company was organized for the production of crude antimony. Following the successful operation of this company others were formed until in 1912 eight smelting works were actively engaged in reducing ore and more than 100 companies were mining both for export and domestic consumption. In 1908 the Kiu Tung Mining Company was absorbed by a new organization known as the Wah Chang Mining & Smelting Company, with offices in the Woolworth Building, New York, which has a capital of approximately $180,000. It is subsidized by the Chinese Government and was granted a monopoly for a term of ten years. Considerable interest is being aroused in antimony mining, and it is reported that a local company representing American interests recently received orders for modern mining machinery to be used in the antimony mines of Hunan.

THE MANUFACTURE OF ADMIRALTY GUN METAL IN ENGLAND

SOME NOTES REGARDING THE PRODUCTION OF THE BRONZE 88 COPPER 10 TIN AND 2 ZINC NOW SO MUCH IN DEMAND FOR WAR PURPOSES.

BY H. S. PRIMROSE, M.T.M.

(Continued from June.)

LAY-OUT OF FOUNDRIES.

One of the main considerations to be kept in view in operating a modern foundry is economic working, and this may be largely brought about by having a proper system of laying out the foundry plant, which should include as many labor saving devices as possible so as to reduce most of the operations to a mechanical repetition. The working floor must be kept as clear of obstructions as can be conveniently arranged, and it is most essential that the plant should be laid out in such a manner as to allow of the metals passing through the various stages of its treatment in the foundry in a straightforward direction. Any deflection from the most direct path or doubling back upon its course is carefully to be avoided, as not only is valuable time and labor lost in this way, but confusion and untidiness inevitably results.

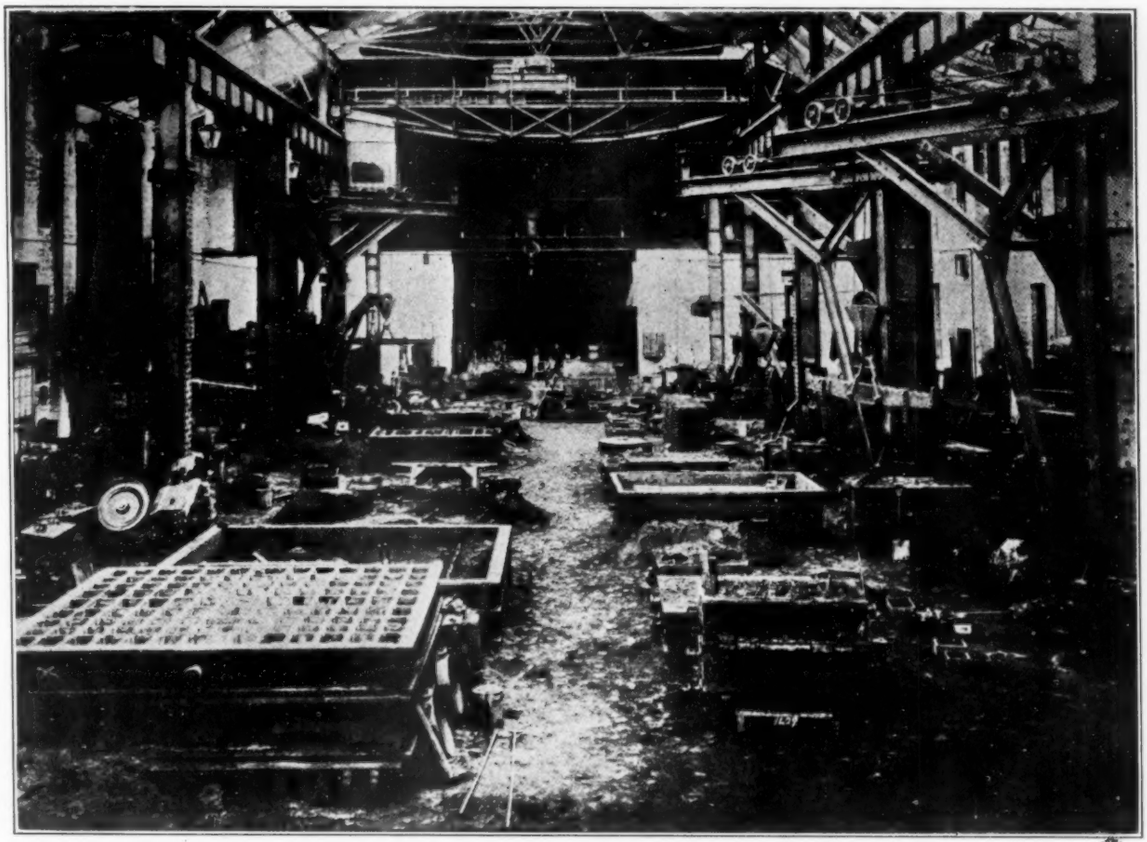


FIG. 3. VIEW IN AN UP-TO-DATE FOUNDRY, SHOWING A NUMBER OF ELECTRIC CRANES ARRANGED TO WORK UNDER, BUT CLEAR OF A 30-TON OVERHEAD CRANE.

Permanent fixtures should be placed in groups around the sides of the foundry floor, and each casting bay is preferably served by an overhead crane. If the bay is a long one, then two cranes are desirable, and prove so useful in many ways that they save their cost time and again on account of their being able to handle material at two places simultaneously, and this prevents much loss of time on the part of men waiting on plant or its removal.

A very important point to be considered in designing a foundry for either brass or bronze casting is the provision of ample light and copious ventilation. There are many advocates of the northern system of lighting which prevents direct sunlight from reaching the floor, but there is no real objection to having the roof lights placed centrally so that the light enters directly instead of by reflection as in the saw-tooth roof. The proportion of the roof under glass may be made as large as possible, and numerous openings should be left to form ventilators by which the fumes and hot gases can readily escape to the outer air. It is advisable to have the openings arranged so that they can be opened or closed to suit changes in the direction of the wind, and the entire length of the roof at the apex can with advantage be made in the form of a Louvre ventilator, the slats of which do not allow rain to enter, but always permit air and fumes to get out. Poor ventilation is highly injurious to the health of the workmen, and soon reflects itself in the character of the work produced. Special regulations are in force in those brass shops which have less than 2,500 cubic feet of air space for each employee engaged at the work. The best plan is to have a sufficiently high roof to give upwards of 3,000 cubic feet per man, and if it is not possible to do this, some form of artificial exhaust is necessary.

FOUNDRY PLANS.—In order to incorporate the fore-

going ideas graphically, two plans of modern foundry lay-outs are here reproduced. Taking the case of the small foundry first, a very useful method of setting out is illustrated in Fig. 4. This shop contains three-oil-fired furnaces, arranged in a battery at one end, and if the size of pots be selected at 100 lbs. each, the foundry should be capable of producing at least one ton of castings per day of 9½ hours, assuming a yield of nine melts out of each pot. If a lesser output is required, one or more of the furnaces may be shut down. To keep all the heat at one end, the drying stove is arranged abreast of the furnaces and one stack is thus sufficient for drawing away the fumes from the hood over the furnaces and the hot gases from the stove. Along the adjacent wall are fitted the moulding benches, and at the north end may be placed the moulding machines. This leaves the entire floor space right wood. The proximity of the brass finishing shop is also shown, into the brass store of which the castings can be easily conveyed after fettling and weighing.

The plan of a somewhat larger foundry is shown in Fig. 5, and this includes two separate bays, each 60 ft. wide and 160 ft. long. These are separated by a small gauge track which runs the whole length of the shop in the centre and which can thus serve both bays. Two electric cranes are installed in each bay, although those for the side dealing with light castings need not be so heavy as the others. Five and ten-ton cranes respectively should be used for this work. Over the pot fires only small jib cranes,—operated either hydraulically or by electric motor—are placed beside the two batteries of crucible furnaces to facilitate the withdrawing of the pots. On the heavy bay side, the air furnaces are ar-

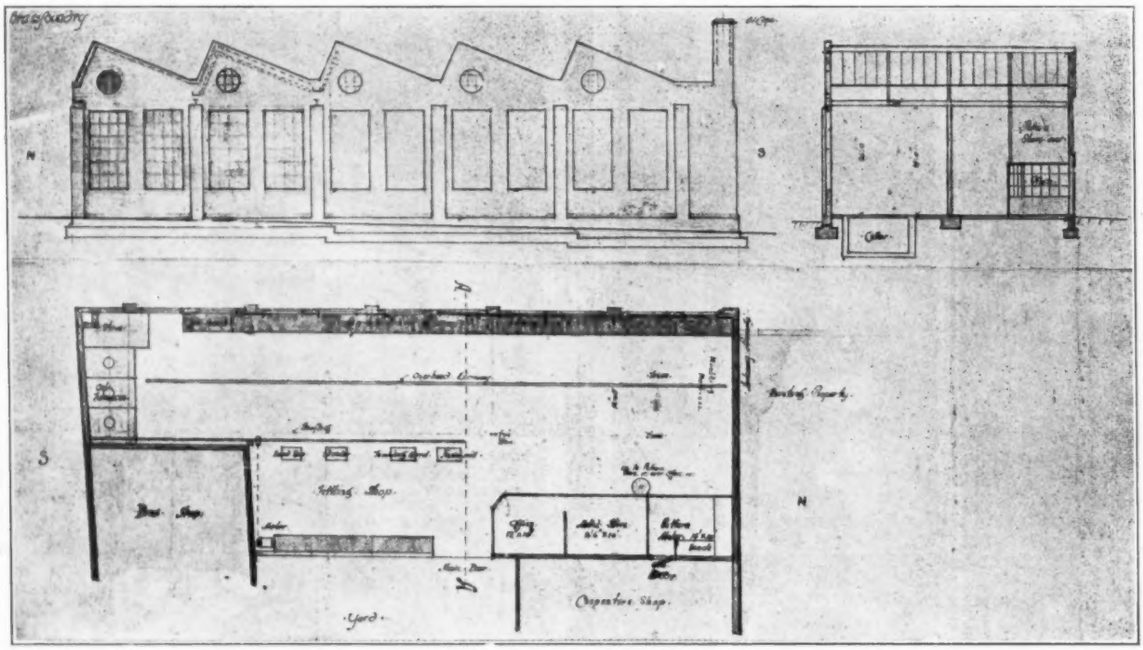


FIG. 4. PLAN AND ELEVATION OF A SMALL BRASS FOUNDRY.

up the centre of the foundry to be used as a casting floor, and this is served by an overhead runway capable of handling up to 5 cwts. loads. The rough castings when knocked out of the boxes are transferred to the fettling shop at the side, where a line of shafting is conveniently arranged to drive the emery wheels, tumbling barrels and sand-mill. The blower for the oil furnaces can also be worked from this shaft which can easily be driven by a 10 H.P. electric motor. The foreman's office, metal store and pattern shop are grouped together apart from the rest of the foundry, with the pattern store above as shown in the sectional elevation. Sand and spare tools are stored in the cellar shown underneath the floor level, and the sand may be easily shot in from the outside through a trapdoor, and elevated to the foundry as required. In a small shop like this it is preferable to have the metal store in close proximity to the foreman's office rather than near the melting furnaces, and the office should be near the main doorway, and only exit. The foreman should be able to have a full view of the shop from his window in order to exercise the proper supervision of the workmen. In the plan shown, the carpenter's shop of the works is close to the foundry pattern shop with which it is made to communicate direct for convenience in storing and cutting up the necessary ranged staggered so as to admit of ready access of the ladles to the tapping spouts. In this case the large amount of metal dealt with makes it advisable to place the metal store near the furnaces, the pot fires are also in close proximity. The arrangement of stoves and sand bins in each bay is such that they have the maximum degree of accessibility, and, at the same time, since they are built as annexes to the main building, this leaves the whole of the floor spaces available for moulding and casting. The stoves being placed outside render the temperature less liable to become excessive in hot weather. The coal and coke bins are so placed as to be readily filled from outside, and yet be convenient to the various points at which the fuel is required inside the foundry. The hand operated moulding machines and power squeezers for small repetition work are arranged in the small casting bay near the central track, and the moulding boxes when made up and completed, are set out in rows behind the machines on the concrete floor. To prevent accidents with spilled metal, a thin layer of spent sand may be left around the boxes. At the opposite side of the track the jolt rammers and plates for moulding heavy work are set out, and in each case the middle of the foundry floor is left free for the laying down of the boxes in a definite arrangement when ready.

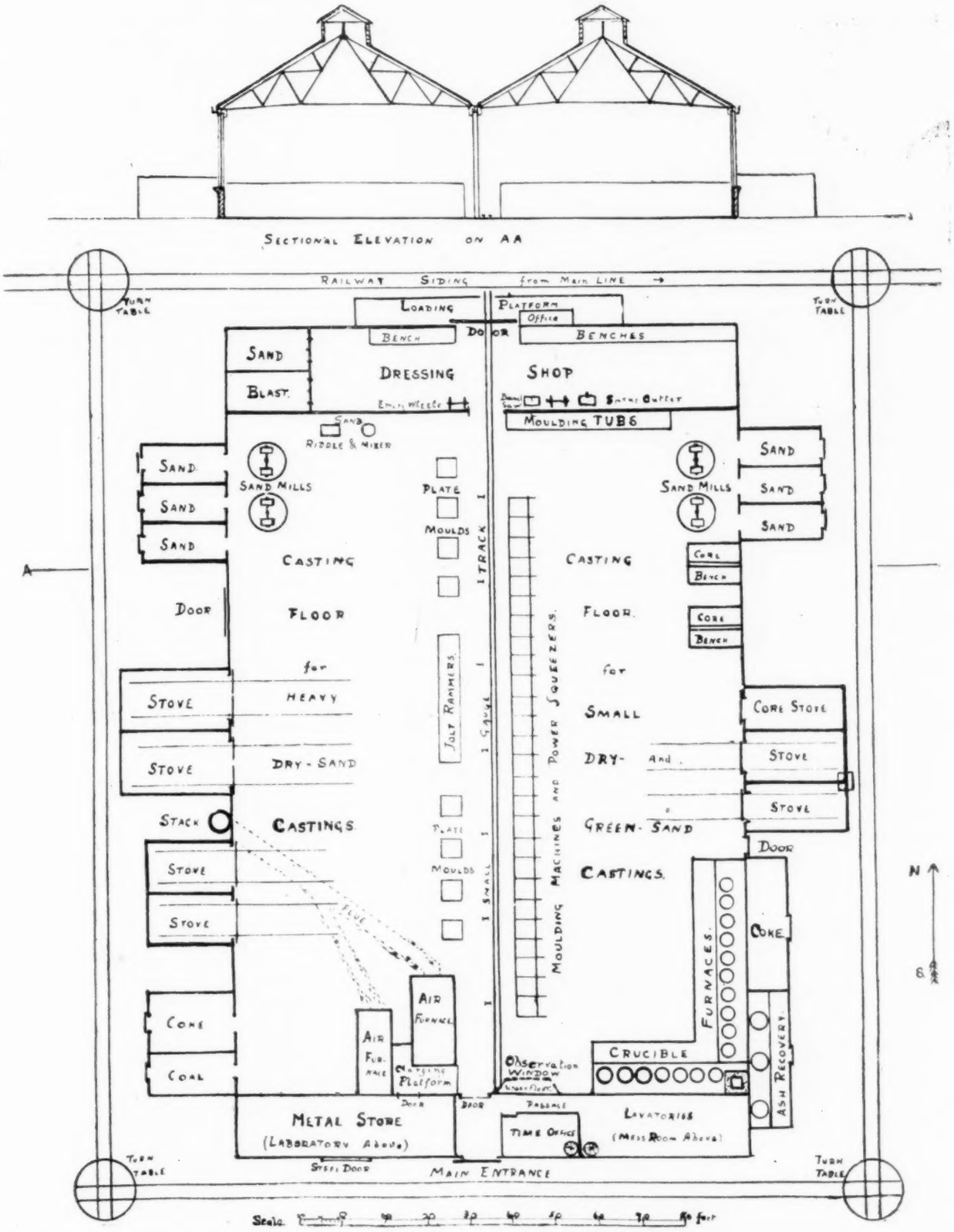


FIG. 5. PLAN AND ELEVATION OF A LARGE BRASS FOUNDRY.

The fettling shop occupies the complete end of the foundry, and at one side of this may be placed the sand blast plant for cleaning the castings. The ordinary powerdriven emery wheels, sprue cutters and a band saw may be arranged in a line along the partition wall, and behind the dressing shop, the despatch shed may be set out along the railway side-track. The plan shows the disposition of the four wagon turn-tables so that the loads of all material can be side tracked and unloaded direct into the respective bins. The metal store is here placed opposite the store-keeper's office and the main entrance, above which the foreman's office may be made with a bow window for completely overlooking the shop. The remaining space upstairs may be taken up by the mess-room and locker accommodation for the men on one side, and a laboratory and testing room on the other.

FOUNDRY PLANT.

STOVES.—As the most important castings in gun metal must be made in dry sand moulds, it is necessary to provide ample and efficient drying accommodation. This is easily accomplished by building a number of stoves to suit the class of work engaged in. Thus for small castings the stoves need not be of large size, and a number of small stoves is more convenient to work with than a single large one taking a large number of boxes. The drying should not be conducted at too high a temperature, and the firing should be so controlled as to give a uniform and constant heat to the moulds. Where possible these may be stacked in open formation on a carriage which can be run into the stove, and the simpler these carriages are made in construction the less liable they are to go wrong in working. The object of drying being to remove all the moisture from the sand in the mould, and as evaporation only takes place at the surface, slow heating is necessary in order that the drying may not be too rapid, as otherwise the moulds may crack up and be destroyed.

Various attempts have been made to use gas firing with producer gas, and if sufficient care is taken with the regulation of the gas making, this should be perfectly satisfactory. Only large plants, however, require so much gas as to make the erection of a producer profitable, and it is usually out of the question to use ordinary town or coal gas which would be far too expensive. In the commonest practice use is made of smithy charcoal or coke in small hand-fed fires which are placed at intervals round the stove if large, and at the end if only a small one is employed. The outlet for waste gases carrying both the moisture from the moulds and from the products of combustion, should be made in the floor near the door in order to conserve the heat as much as possible, and then the hot gases are carried back underneath the floor by flues before passing away to the stack.

As there are always a large number of small cores to be dried in a gun metal foundry, it is advisable to have some small fixed or portable stoves which may be either gas or coke fired. These stoves are usually made square, and some are provided with sliding trays to carry the cores to be dried, but a very convenient form is the swing tray which is not so apt to jar the cores with opening and closing. These quadrant stoves have not usually as much capacity as a similar size of square stove.

CRANES.

A large variety of foundry cranes is now obtainable, and where electric power is available motor drive is most convenient, and often least expensive. Nearly all the overhead cranes are now driven in this way. Smaller cranes are also very serviceable, and those placed near a wall can, with advantage, be made able to travel on a mono-rail on the bicycle principle. Where a small side bay is used in addition to the usual central bay with overhead cranes, great advantages may be derived from the installation of upright pillar cranes which can swing completely round the principal, as this enables them to transfer boxes from one bay to the next. A useful form of crane is arranged so that it can be readily operated either by hand or by motor. It is capable of lifting up to five tons at a radius of 15 feet. For slow steady lifting, such as is needed when drawing a pattern out of a mould, the hand gear is used for the first part of the lift, and then by a simple release of a clutch arrangement, the handle is disengaged, and the driving pulley thrown in which connects with a five H.P. motor. When the electric drive is used, the handgear is unclutched, so that the handles do not fly round. For traversing and turning, hand-power only is required, and the roller parts make these operations very easily performed by one man, even with the full load. This type of crane is not permanently fixed to the column, but can be shifted to any column where required by means of the overhead traveller. By the courtesy of Messrs. Ransome & Rapier, Ltd., we are able to give (Fig. 3) an excellent view of their Ipswich foundry in which is shown a number of these electric jib-cranes, arranged to work under, but clear of a thirty-ton overhead electric crane.

Still smaller cranes are sometimes used as, for example, in lifting crucibles out of the pot fires. These are of quite simple construction and may be operated either by hand or by power.

In many up-to-date foundries use is now being made of over-head runways or mono-rails which consist of a simple H-beam carrying the four-wheeled runner. On this is hung the triplex block or electric hoist which enables a workman to pick up a comparatively heavy load single-handed and transport it to a distant point with a minimum of labor. A great advantage of this system is the arrangement of switches which provide for overhead tracks being led in various directions.

(To be continued.)

LEAD USED FOR BOMBS.

Interesting application of the use to which metals are being put is given in the report in the daily papers of the bombs which German plotters made to put on sugar ships in New York harbor. It is said that the bombs were manufactured in the following manner:

A strip of sheet lead was rolled into the shape of a cylinder, closed at one end, about five inches long, and perhaps an inch thick. This work Ernest Becker, the electrician on the Kaiser Friedrich der Grosse, has admitted that he did. Into about two-thirds of the length of the cylinder was packed an explosive the nature of which is at present under analysis. Into the rest of the lead container was inserted an aluminum capsule, closed at the inner end and with a hole for a cap in the other.

Into this capsule was poured an acid in diluted form, which would eat through the aluminum cover in four or five days. The capsule was finally sealed with a lead cap, on which the acid would have no effect. The bomb was made stable by a large, irregular piece of tin soldered on one side of the lead container. When the acid ate through the aluminum and came into contact with the explosive the detonation took place.

Aluminum Production.

Aluminum production in 1915 in this country is estimated by several authorities at about 80,000,000 pounds, a record achievement, comparing with about 45,000,000 pounds in 1914.

THE CARELESS HABIT

THE MOST COMPLETE SAFEGUARDING OF ALL MACHINERY AND OF ALL DANGEROUS PLACES IN AND AROUND WORKROOMS CAN PREVENT ONLY A VERY SMALL PROPORTION OF INDUSTRIAL INJURIES. A PAGE OF SAFETY-FIRST HINTS PUT FORTH IN A STRIKING MANNER, FROM THE MAY ISSUE OF THE "SPIRIT OF CAUTION," ISSUED BY THE NATIONAL AFFILIATED SAFETY ORGANIZATIONS.

Provision of comfortable safety goggles will not be neglected.

It would be folly to expect that a careless workman would or could *train himself* to be careful.

A warning of one workman by another often wins because of its fraternal touch.

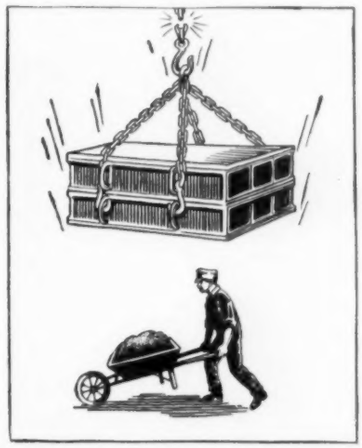
"Stop the press; *then* oil it!"

The risk involved puts a good workman on his mettle.

In rare cases severe discipline is needed.

"They may fall on some one if you pile **them that** way."

A table insecurely placed does not make a **good platform to stand on.**



Chains and slings should be frequently **examined.**

EDITORIAL

OLD SERIES Vol. 22. No. 8 — NEW YORK, AUGUST, 1916 — NEW SERIES Vol. 14. No. 8

THE METAL INDUSTRY

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CRUCIBLE JUSTICE

Crucibles for the melting of brass and other copper alloys as now being manufactured contain American clay instead of the Klingenburg clay imported from Germany. A great deal has been said regarding the lasting qualities of these crucibles and in most of the reports we have seen they do not show up in a very favorable light when compared to the ones formerly used. We thought it would prove interesting to see what could be said for the American clay crucible itself when seen on the firing line. With this in mind we inspected a pile of several thousand soldiers that had served their time in the fiery battle. To say we were astonished at what we saw would be saying little. Of all the crimes on the calendar that could be committed against the helpless crucible we do not believe there was one omitted.

Beginning with a brand new crucible that never saw the fire but broken in handling and its kiln brother rendered useless by "scalping" from too quick heating we can run down the list until we come to the unfortunate individual that had been squeezed until it split because the tongs gripped it above the "bulge." There were crucibles with holes punched through bottom and sides with an improperly shaped stir bar. There were crucibles with great pieces broken out of the sides due to being gripped with spelter tongs to straighten them in the fire. There were crucibles that had not more than one or two heats to their credit that were split because the metal had been wedged in so tightly that when it became heated it had no room to expand. There were crucibles with the edges broken down because of the rubbing of the stir bar and there were crucibles with rings eaten in around the metal line due to use of injurious fluxes. It would be no exaggeration to say that fully 60 per cent of the crucibles on this pile had failed because of improper mechanical handling rather than because of failure of mixture.

Going into the casting shop where these atrocities had been committed we were horrified to see them in the making. Crucibles that had been put in the fire for the first time were coming out with gaping cracks out of which the metal flowed in thickening streams. Close investigation showed that they were packed with the now familiar "disc" scrap which was not even entirely melted but expanded enough to split the crucible and let out what melted metal there was in it. We saw crucibles being pulled up in the fire by means of the thin nosed "spelter" tongs with the resulting gashes in the sides. In fact we saw here corroborated in actual practice the mute evidence of the dead sufferers on the pile outside. It may be said that this evidence in favor of the crucible

was gathered in one shop and therefore valueless. We say that it is valuable for the operatives in that shop came from and were schooled in some of the largest and best run shops in the country, and, of course, they were only doing what they had done at other places, and, what probably they would do again when they moved on!

There is very little that can be said in defense of such careless and criminal (to the crucible) treatment of crucibles. The one evil of the lot that we noticed that there might be some small justification for is that of "scalping." Due to the frantic haste necessary in the filling of "war orders" and the scarcity of material, it has become necessary in a great many cases to put the crucibles as soon as they are received from the manufacturer into the fire without the proper preannealing, but admitting the need for haste, it seems as though it could be arranged to give the crucibles at least a short heating in the annealing furnace.

From the above it will be seen that the crucible of today is not getting a fair deal. The crucible manufacturers have done and are doing all in their power to produce as good a crucible as is possible under the conditions. With the difficulty attendant upon the securing of graphite, the necessity of finding a substitute for Klingenburg clay and above all the tremendous sudden demand for crucibles staring them in the face, they met the issue fairly and squarely and did their best to produce. With hardly any time given for experimenting crucibles have been hurried from kiln to casting shop fire and the result has been what we saw, "scalped crucibles." Crucibles lost in this way together with those lost from other causes which we have enumerated foot up to a sickening total when reported to the "office." The number of pounds of metal melted for a certain time is set against the number of crucibles used to produce this weight and the result is a discouraging number of heats per crucible.

There is only one way to correct these faults and meet the crucible manufacturer half way and that is to treat the crucibles for what they are; fragile receptacles.

Crucibles should be annealed thoroughly when received from the factory by being slowly heated to a cherry red heat, allowed to cool slowly and if not used at once should be kept in a dry and warm place. In order to prolong their life they may be "brasqued" as practiced in England. This is accomplished by coating with a wash of refractory material of which there are several good ones on the market. They then should have careful handling in the fire. By careful handling we mean not to do just those things which we have told about in the beginning of this article. One of the most important things in this respect is to see that the tongs fit the crucible properly and will grasp it firmly and evenly and without undue strain. The tongs should be fitted by the blacksmith from time to time and not in the manner that we saw being done; banging the tongs when red hot on the iron floor of the shop! One way to insure proper handling of crucibles in the shop is to follow the English custom and charge each caster with his set of crucibles at cost price, penalize him for each crucible that fails irrespective of the cause and allow him a bonus for all that last over and above a certain prescribed number of heats based on the kind of metal melted. This certainly would give the crucible a chance and it would then stand upon its merits alone.

As a result of our investigation then we believe that until the crucible receives the mechanical treatment that is its due, it is useless to attempt to make even a general comparison of the merits of American or any other clay.

NICKEL ON THE DEUTSCHLAND

There has been considerable discussion during the past weeks in metal circles as to where the *Deutschland*, the German submarine, got her cargo of nickel that she is now carrying back to Germany. The first conclusion arrived at by those who attempted to explain the source of supply was that it had been obtained from the International Nickel Company, which has been credited from time to time as being in control of the nickel production in this country. These conclusions are said to be erroneous by the officials of the company, who are reported to have said: "All the nickel that this company has sold since the war started has been traced and none has been sold by the corporation for the ultimate use of Germany.

"It is a mistake to say that the International Nickel Company controls every ton of nickel in the United States," continues the report. "There are hundreds of tons obtained through various copper mines in this country and also from New Caledonia. This corporation has an agreement with the Canadian government which makes it impossible for us to supply nickel to any country with which Great Britain is at war."

The Canadian government instructed its agents in this city to investigate the source of supply if a cargo of nickel was available. "The attention of the government has been directed to the statement that nickel which, it is said, will be conveyed by a German submarine from Baltimore to a German port is from Canadian mines," the Canadian government announced. "This allegation is based upon the statement that no nickel is refined in the United States except what is derived from Canada. That this is wholly inaccurate is shown by the report of Major Graham A. Bell, who, since the early months of the war, has had the duty of examining and supervising the destination and use of all nickel refined in the United States from Canadian ore."

Major Bell's statement was that a quantity of nickel ore was obtained through various copper mines in the United States, and this was refined principally by the American Smelting and Refining Company. Nickel ore, he said, is obtained also from New Caledonia, which is refined by the United States Nickel Company, of New Brunswick, N. J. The quantity of nickel derived from this source, according to Major Bell, reaches "some hundreds of tons annually."

Major Bell's statement is supported by the figures that

are given in the 1914 report of the United States Geological Survey, Mineral Resources of the United States. These figures are the latest published: During 1914, 845,334 pounds of nickel, valued at $303,000, were recovered as a by-product in the electrolytic refining of copper. As the production of copper in this way for 1914 was 1,150,137,192 pounds and the production for 1915 is figured at 2,500,000,000 pounds the nickel production must have increased accordingly. Could not the *Deutschland's* cargo have easily come from this source?

CORRESPONDENCE AND DISCUSSION

WE CORDIALLY INVITE CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY.

GALVANIZING

To the Editor of THE METAL INDUSTRY:

Noting your editorial on "Common Sense in Galvanizing" which appeared in the July issue of THE METAL INDUSTRY, and which was a direct result of an unusual number of inquiries received at your office relative to the proper methods to pursue when galvanizing articles by the hot process, I beg to differ with you on about everything you advise the tyro to do, with the possible exception of the acquisition of common sense, which you so strongly recommend to those who have been foolish enough to try their hand at the game.

Just five years ago I knew as much about hot galvanizing as about Egyptology, and to be perfectly truthful, I do not make any claim for having any excessive knowledge of the gentle art of galvanizing even now, after sixty months of the most gruelling experience with the most unreliable set of "rummies" that ever infected any vocation. Right here let me say that if the consumption of alcohol could be eliminated from the art of covering iron and steel with zinc, half the battle would be won. Not that alcohol is used in the process, but that both galvanizers and their helpers are so prone to take an internal bath of this fiery liquid at every opportunity that a day's work is of secondary importance in their eyes.

Your advice to beginners to use nothing but Prime Western spelter is true to this extent only; that is, if it can be procured the advice is good, but there are so many brands of Prime Western that are anything but "prime," that the advice lacks the punch. Rather let it be said that it is always better to deal with a reliable firm, who would scorn to sell anything but the best brands, and after that has been done you have eliminated one of the many troubles that beset the path of the greenhorn.

Next on the list is the temperature, and while Flanders, in both of his books, is as near right as could be expected, yet there is a lot more than temperature differences for various classes of work that must be considered, and that is, keeping the temperature the same. I will say here that the firing of the kettle is of such paramount importance that it overshadows every other consideration; yes, even the kind of spelter used. The pyrometer, it is true, will indicate the degrees of heat, but it will not regulate the fires when castings or forgings are placed in the kettle, which may or may not be heated to the same temperature as the molten metal before immersion in same. My advice to those starting in this heart-breaking business is to get a galvanizer (drunk or sober) who knows his business and let him take care of the outfit. If he proves to be a good man, though a "rummy," do not fire him, as his successor will be a "rummy" as well, and probably not as good a mechanic as the first. Then pick out some bright young fellow who is anxious to get ahead, and put him helping the galvanizer with instructions to keep his eyes and ears wide open, and at the end of six months or so, if the chief "rummy" goes on a "batt," you will have a dependable man on hand.

You also assume in your editorial that the articles to be galvanized have been pickled properly, and you do not deem it necessary to give any advice on that angle of the art. Again you are wrong, as pickling is a very important part of galvanizing as the beginner will find out in due time. If you use hydrofluoric acid alone for your first pickling, you can have it either too strong or too weak without half trying, and the iron-clad rule of "thirty of water to one of acid" sounds good, but it does not always work, as you will find out if you stick to it.

Sulphuric acid is very often used in place of hydrofluoric, and those who advocate either are equally positive that they are right; but my experience has been that hydrofluoric is far superior and more reliable. A pickle kept hot is much more effective than when not heated, and to be able to tell when to put in more acid or water is not learned in a day, a week or a month.

Iron or steel pieces that have been thoroughly sand blasted need but very little pickling; in fact I have dipped gray iron castings into the muriatic acid bath for but a few minutes without any previous pickling, and have had good results. I would not advise this to be done on all gray iron castings, as it will fail more often than it will help, but if you can get castings that are both clean and soft, it is well worth trying.

There is more ignorance associated with galvanizing than with any other business, and the best galvanizer is not overburdened with enough initiative to pull away from a lot of hard and fast rules that have been handed down from one to another. One galvanizing expert who visited our place, threw a fine fit of the "blind staggers" when he realized that we had pulled away from the ancient custom of building a brick wall around the kettle so as to support it, and had substituted a cast-iron box instead. When he realized that we had swept aside the moth-eaten rule of making the kettle of fire-box steel (whatever that may mean), or wrought iron, and had the cheek to use cast iron instead, he looked at the writer in that peculiar way that we all assume when gazing at an inmate of an insane asylum; but our cast-iron box and kettle are still in the running.

Beginners may as well understand at the outset that there is nothing cheap connected with galvanizing, and unless there is a fair-sized bank roll back of the venture my advice is not to start at all, as disappointment will inevitably follow. When spelter was five and a half cents a pound there was a bare chance of succeeding without trimming the bank roll, but with the prices for spelter that have prevailed this past year or so, it would be a brave man indeed that would have the nerve to even start.

The acids and coke also cost a lot of money, particularly the acids, just now, and it may be well to call to the attention of those who intend to start their own plant, that the fires around a galvanizing kettle must be kept up all through the night, with just enough heat to keep the metal fluid so as to prevent the formation of dross. If the fires are intelligently handled the metal will be at the right temperature when the crew is ready to start in the morning, and if you can find a night watchman that will do this without grumbling, raise his wages right away, as he will not live long, for a good night watchman never does who has to keep up the fires of the galvanizing outfit.

W. H. PARRY.

Brooklyn, N. Y., July 25, 1916. National Meter Company.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE.

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical PETER W. BLAIR, Mechanical CHARLES H. PROCTOR, Plating-Chemical

CASTING

Q.—Would you kindly inform me where my trouble lies in yellow brass castings? We make car trimmings and also some highly polished goods, such as candlesticks, etc. The castings seem to be solid, but after sand blasting blow holes appear in the castings. Our mixture is 2½ to one of zinc with about ¼ of a pound of lead, and we have used about 2 ounces of manganese copper to a pot of metal, which helped some. Also kindly give me a mixture for aluminum motorcycle crank cases, for bronze bearings and for German silver.

A.—Yellow brass makes a lot of oxide and you may find that the judicious use of skim-gates will obviate your troubles. An alloy of 93 parts of aluminum and 7 parts of copper is used for crank cases. Standard phosphor bronze is the best bronze for motorcycle bearings. Use copper, 77; tin, 10; lead, 10, and 15 per cent. phosphor copper, 3. A good German silver mixture consists of 65 of copper, ½ of manganese copper, ¼ of aluminum, ½ of tin, ¼ of lead and 33½ of zinc.—J. L. J. Problem 2,328.

BLUING

Q.—Would like to know if you can give us any idea how to get a blue, that is, a dark blue on brass trimmings? A.—For a blue finish on brass we would suggest either of the following two solutions:

1.

Water	1 gallon
Hyposulphite of soda	8 ounces
Acetate of lead	2 to 3 ounces

Use the solution at from 180 to 200 degrees Fahr.

2.

Water	1 gallon
Hyposulphite of soda	8 ounces
Nitrate of iron	1 to 2 ounces

The proportions given above may be slightly increased in order to give the color more rapidly.—C. H. P. Problem 2,329.

DETINNING

Q.—How can we detin old tin scrap, such as tin plates, sheets, cans, etc.? We desire to know the process by which the tin can be removed from the iron or steel, whether by the use of chemicals (and if so what chemicals) or by roasting or sweating.

A.—Various methods of detinning have been patented and they can be referred to by consulting the past numbers of THE METAL INDUSTRY. Among the methods may be mentioned solution of the tin by alkalies, alkaline sulphides, chlorine, etc., and its recovery by electrolytic methods. Other methods resort to sweating and at the same time centrifuging or rubbing off the heated tin from the scrap by means of an abrasive. We would advise the acquiring of some manufacturing rights under some successful patent.—J. L. J. Problem 2,330.

MIXING

Q.—Please give us a formula for use in making up gear blanks, these blanks are used in automobile magnetos and are 3½ inches in diameter with a ½-inch face.

A.—The following is a good formula for gears:

Copper	87½
Tin	9½
Phosphor copper 15 per cent	3

This bronze can be machined at a rapid rate without tools "chattering" and it is still hard enough and tough enough to have excellent wearing qualities and give good service.—J. L. J. Problem 2,331.

Q.—We intend to make a large quantity of semi-steel and gas tractor castings, and on account of this line of castings being new to us we would like to have you advise us on the following questions: What should the analysis of semi-steel show? What should be the approximate mixture of semi-steel and what should the analysis of tractor castings show? Also what should be the approximate mixture of tractor castings and what brands of pig iron should be used?

A.—Semi-steel should have a tensile strength of from 32,000 to 35,000 pounds. Its analysis should be: Total carbon, 2.40; combined carbon, 601; graphitic carbon, 1.80; manganese, .50; silicon, 1.40; sulphur, .075; phosphorous, .320.

A good grade of No. 2 foundry pig iron, not over 0.5 per cent. phosphorous and about 0.8 per cent. manganese with 25 per cent. steel added will give this result. Semi-steel, to be satisfactory, should be made in the open hearth furnace and its composition controlled by analysis. When made in the cupola it requires constant attention to avoid hard spots and lack of uniformity.—J. L. J. Problem 2,332.

Q.—Please give me two mixtures of manganese bronze, very strong and tough, that will give satisfaction when used in the construction of automobiles, one with manganese and the other with ferro-manganese. At what stage of the melting should the manganese and ferro-manganese be added?

A.—A manganese bronze may be made from pure metallic manganese by melting 2 pounds of this material with 55 pounds of copper, adding 41 pounds of pure zinc (lead content 0.10 per cent. or under), and finally 2 pounds of aluminum.

When ferro-manganese is used a manganese alloy is made by melting together 22½ pounds of wrought iron and 5 pounds of 80 per cent. ferro-manganese. When melted, add 12½ pounds of tin. To 55 pounds of copper add 2 pounds of this manganese alloy and 42½ pounds of pure zinc. Finally, add ½ pound of aluminum.

A melter skilled in the mixing of manganese bronze can take either of the above formulae or any similar formula, and make excellent manganese bronze. But a man without any experience in making this alloy will usually meet failure. It is for this reason that it may be economy for the brass founder to buy any manganese bronze that he may need from a reliable manufacturer of ingot manganese bronze.—J. L. J. Problem 2,333.

Q.—I have some rings to make to be used instead of packing. The customer claims that he had these rings made of an easy turning white metal, and under the pressure of the air the rings which are not cut would stretch about .0002 of an inch, and when the air was released would spring back to their original size. Do you know of any mixture that will act this way?

A.—A cut ring of bronze has been used successfully for the purpose that you mention. The mixture is composed of copper 80, tin 20, and the rings are tempered to increase the elastic limit of the metal by heating and quenching in water just as steel is tempered.

Most of the white metals are weak and have very low elastic limits, which would render them unsuitable for such rings as you have in mind. There are a number of zinc base alloys that are very hard and strong, but they are rather brittle. One that might answer is composed of

Zinc (with lead under 0.10 per cent)	85
Copper	10
Aluminum	5

Another alloy that is not by any means as strong as the above, but which has considerable toughness, is

Tin	83⅓
Copper	8⅓
Antimony	8⅓

Both these alloys can be cast in sand, the first named being especially adapted to sand casting. Better rings would be obtained, however, if discs were cast in metal molds and the rings turned up from the discs. This plan would give metal of a uniform grain and of a high elastic limit, due to the chilling action of the mold.—J. L. J. Problem 2,334.

OXIDIZING

Q.—Will you kindly give me a formula for an oxidize to be used on sterling silver? I wish one that does not contain any platinum and that can be used cold.

A.—Sulphuret of potassium was almost universally used for oxidizing silver goods until the material became so scarce and expensive. Polysulphide is a much better materal, and can be used in the same manner as the sulphuret of potassium, but neither of these materials work cold upon silver.

The best way to use the Polysulphide is to prepare a concentrated solution, heat the silver parts and apply the Polysulphide and the oxidation will take place in a moment or so. The material should be applied with a small brush. The silver articles may also be painted and then heated over a bunsen flame for a moment.—C. H. P. Problem 2,335.

Q.—We would like very much to know of a method of oxidizing aluminum.

A.—Oxidizing aluminum is a difficult proposition. The black surface noted upon aluminum is all produced by a celluloid black lacquer.

A method that is used for producing a bluish black tone upon die castings made from zinc and aluminum might answer the purpose. This solution consists of preparing a concentrated solution of cyanide and powdered white arsenic in boiling water. The following proportions might be tried:

Water	1 gallon
Cyanide 96-98%	3 pounds
White arsenic	1 pound

Dissolve by agitation or stirring the mixture. The solution so prepared will become a deep black. When about to use arrange as many gallons of boiling water as will be required for coloring the articles and then add sufficient of the concentrated cyanide and arsenic solution to produce the required finish. From 4 to 6 ounces of the mixture per gallon of boiling water may be required. While coloring the aluminum the articles should be moved to and fro in the solution.—C. H. P. Problem 2,336.

PLATING

Q.—Will you kindly advise us as to whether 95 per cent. cyanide potassium is more economical for the electro-plating of cheap jewelry than the cheap cyanide of sodium?

A.—Cyanides depend upon their cyanogen content for practical results and not upon the potassium or sodium salts that hold the cyanogen in their respective compounds. If it were otherwise there would be no need of cyanides for plating purposes, as either carbonates of sodium or potassium could be used. Cyanide of potassium is designated as 95 per cent. and cyanide of sodium 129 per cent. The cyanogen content of the cyanide of sodium is therefore one-third greater, so at least one-third less of cyanide of sodium can be used to obtain the same results based upon the use of cyanide of potassium.

There is no such material as a "cheap" cyanide of sodium as you mention.—C. H. P. Problem 2,337.

Q.—We are manufacturing cast iron traps which are to be brass plated. We are using a hot brass solution and are having trouble with it ever since we started to use it as a hot solution. It gives a very nice bronze color when hot and when cold gives a good yellow color, but what we would like to do is to use it hot and still obtain a yellow color. Can you advise us what to do to get a satisfactory finish?

A.—Brass solutions that give satisfactory results in color, etc., when run cold deposit more copper when used hot. A method of overcoming the bronze tone produced by heating the solution would be to add more zinc in the form of zinc cyanide. From ½ to 1 ounce of zinc cyanide and an equal amount of sodium cyanide or ¾ o 1½ ounces of cyanide mixture will probably give you a good color, but if the solution is run cold the brass tone will be too light or very pale. You will have to decide to maintain the solution either hot or cold as it will be impossible for you to run it first cold and then hot and still get the same color. —C. H. P. Problem 2,338.

Q.—I have a silver solution which I have been using for bright plating with carbon bisulphide for a brightener. I now want to use it for plating knives and have worked all the carbon out of it and built it up to four ounces of silver and four and a half ounces of free cyanide to the gallon, but cannot get very good results. The deposit is patchy or brownish in streaks and sometimes a few in a batch and at other times one-third of them will be bad. Can you give any information as to what is the reason and also what will stop the trouble? A.—Silver solutions in which carbon bisulphide has been used continually frequently act in the same manner you allude to, that is, the deposit is not uniform and comes out patchy or streaky. The remaining sulphur no doubt causes this trouble.

It seems as though your solution is deficient in proper conductivity, in other words, your anodes are not yielding up the metal freely and the metal is withdrawn from the solution and brings up the remaining sulphur from the sulphide of carbon more readily.

Sodium sulphite is an excellent conductor for silver solutions that have a tendency to act like yours and we would therefore suggest that you add from a quarter to three-eighths ounce per gallon of solution. Make a test on a ten to twenty gallon solution first and if this does not bring up an even deposit, then put the solution back into your regular tank and make a fresh trial with a similar amount, but instead of the sodium sulphite add a similar amount of ammonum chloride. One or the other will produce the results you desire.—C. H. P. Problem 2,339.

SEPARATING.

Q.—Can you tell me how to separate palladium from gold and palladium filings. I have been dissolving the filings with acid, then precipitating the palladium with sal ammoniac, but it seems as if I only get one-third the amount I ought to get. The mixture is 18 parts fine gold and 6 parts palladium.

A.—Dissolve in aqua regia and evaporate off the nitric acid. Then throw the gold out of the solution first with oxalic acid. Let this stand for a while for complete precipitation. Test for further contents of gold. Then neutralize with ammonia water and a partial pinkish precipitate results, soluble in an excess. To this add hydrochloric acid, which will throw out the palladium as a handsome canary yellow precipitate. Filter off, wash and ignite for sponge palladium.—H. D. C. Problem 2,340.

SOLDERING

Q.—We have found in the soldering of iron articles coated with zinc by the sherardizing or electrolytic processes, to terne plate, that an entirely serviceable joint is difficult to obtain when using "cut acid" as a flux. Are there other acids which are suitable?

A.—In soldering terne plate to a zinc coated surface, it is essential that the surfaces to be joined should be thoroughly clean. Iron articles that are sherardized are not coated with zinc alone, but with a mixture of zinc and zinc oxide as the "blue dust" used in the sherardizing process is composed even when new of only 80 per cent metallic zinc, the other 20 per cent being zinc oxide. Hence before soldering all oxide of zinc should be removed as thoroughly as possible from sherardized articles. Then the articles should be coated with half and half solder using no flux whatever. If "cut acid" is used it forms a gummy mass on the zinc surface, and a good joint cannot be obtained. After the zinc surface is coated with solder a very little "cut acid" may be used to brighten the surface of the solder, although a better flux is alcohol and rosin. Finally the terne plate surface can be joined and the job completed.—J. L. J. Problem 2,341.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST.

1,185,361. May 30, 1916. **Rust-Preventing Composition.** D. Alber, Cleveland, Ohio, assignor of one-half to J. O. Pope, of Detroit, Mich.

The subject of the present invention is a composition of matter for preventing rust in metal. This composition when dissolved in water, is adapted to receive metal pieces and prevent the same from becoming rusted even after long periods, and it also has other uses, serving when dissolved in water and brushed over a metal surface, to so affect the same that it is not liable to rust in the air even when the solution has evaporated from the surface of the metal.

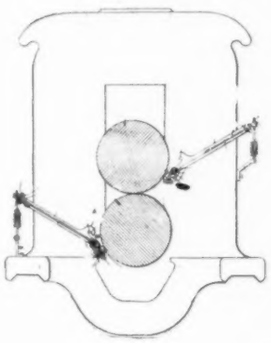
To the accomplishment of the foregoing and related ends, said invention, then, consists of the ingredients hereinafter fully described and particularly pointed out in the claims:

1. A rust preventing composition comprising borax and less than one per cent. of benzaldehyde.

2. A rust preventing composition consisting of 15 parts by weight of borax and one-eighth of one part of benzaldehyde.

1,186,017. June 6, 1916. **Roll-Polisher.** A. J. Maskrey, Canton, Ohio.

This invention relates to improvements in roll polishes for polishing the rolls of rolling mills and the like, and has more especial reference to a roll polisher of the character referred to, which is adapted to be connected to the mill, whereby the rolls at any or all times may be readily and easily cleaned, smoothed or trued by grinding away all roughness or foreign matter which frequently collects or adheres to the faces of the rolls.

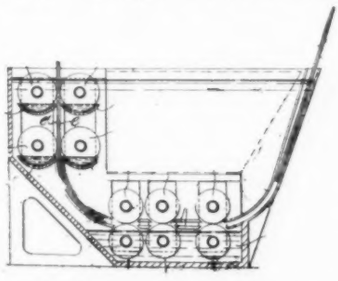


The object of the invention is to provide a device of the above type, as shown in cut, which can be employed for polishing the rolls without interfering in any manner with the operation of the rolls, whereby the polishing may be effected while the mill is in operation.

A further object of the invention is to provide a device which may remain upon the housing of the mill at all times, and which comprises a plurality of independently movable polishing blocks adapted to be held in contact with the rolls.

1,189,573. July 4, 1916. **Apparatus for the Manufacture of Tin, Terne and Other Plates.** D. R. James, Morrison, Wales.

This invention relates to improvements in the manufacture of iron, steel, copper and other metal plates, the object being to coat only one side of the plate with tin, terne, or other metal or alloy.

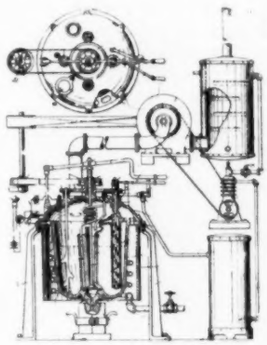


Hitherto the plates have been passed (in the many systems now in use) entirely immersed in the metal bath in the tinning pot or the like, over guides and between rollers, and finally withdrawn through surface-equalizing rolls and rolls rotating in palm oil, resin, grease or other flux which imparts the desired finish, and it has been impossible to form or manufacture a plate coated on one side only.

Accordingly, it will be apparent that a primary object of the invention is to coat a metal plate on one side only, with a suitable metallic alloy or the like, the same entirely covering or coating one side of the sheet, leaving the other side of the plate in its natural state. To this end, there is employed a novel and practical arrangement of devices whereby this object may be successfully and commercially attained, as will be seen in the cut.

1,187,868. June 20, 1916. **Apparatus for Die Casting Metal.** M. Stern, Toledo, Ohio. Assignor to Doehler Die Casting Company, Toledo, Ohio.

This invention relates to the casting of fluid metal, and particularly to the branch of such art known as "die casting," but is not restricted to such use, as it may be used in any connection for which it is applicable.

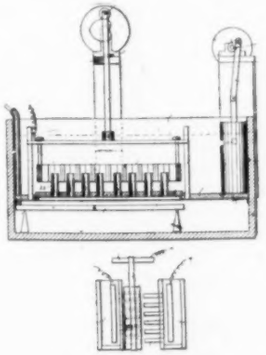


The object of the invention is to improve on the art of die casting of metals, whereby to enhance the practicability and commercial value thereof, and has for its primary object the handling of the metal in a gas free from or containing a small quantity of oxygen, whereby oxidation of the metal is prevented or minimized.

The patent covers: A metal melting vessel, as shown in cut, having a closed top, a part rising within said vessel and forming a passage which extends downward from a point above the high level of metal in the vessel through the bottom thereof and has its upper portion forming a measuring chamber, said passage being closed to the interior of the vessel except at the upper end thereof, and having an enlargement in its lower end portion, a valve disposed within said passage enlargement and seating upward against the restricted end portion of the enlargement, said valve being removable from the passage through the bottom thereof for substitution or refitting without removing the liquid contents of the vessel.

1,188,228. June 20, 1916. **Apparatus for Electro-plating.** F. S. Woodward, Richmond Hill, N. Y.

This invention relates to electro-plating and is designed with a view of producing an apparatus that will deposit metal on the walls of deep pockets or recesses.

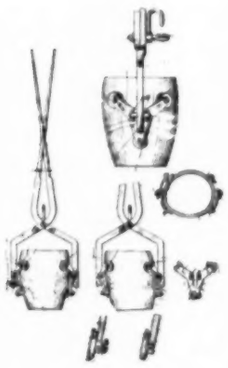


It is well known that, in a plating bath, the current will take the shortest path from the anode to the cathode and, consequently, the outside surface of the cathode will receive the deposit while little or no metal will be deposited in depressions or pockets in the cathode. By the improved apparatus, as shown in cut, the walls of deep pockets may be plated with as thick a coating of metal as the outside surface. The inventor accomplishes this result by completely segregating the anodes in a separate compartment of the electrolyte and by providing open-end tubes which communicate with this compartment. These tubes are so placed that they may be made to enter the pockets of the cathode without touching the walls of the pocket or recess. It is evident that, by this arrangement, the walls of the pocket

opposite or adjacent to the outer end of the tubes are nearest the anode and afford the shortest path for the current from the anode to the cathode.

1,189,107. June 27, 1916. **Crucible Tongs.** E. N. Hiscock, New York, assignor to New Jersey Foundry and Machine Company, of New Jersey.

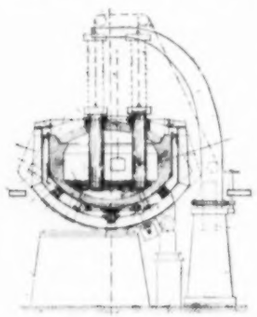
This invention relates to crucible tongs and more particularly to a new and improved form of tongs, as shown in cut, which will evenly distribute the pressure of the load around a true or disfigured crucible without straining or cracking it.



The crucibles, with which the improved crucible tongs are meant to be employed, are used in metallurgical operations in which the crucibles with their metal contents are placed in various types of furnaces in which oil, gas and coal are the most commonly used heating agents to heat up the crucible to the temperature necessary to fuse its contents. In the process of melting, handling and pouring the metal, the crucibles, which are made of friable material, usually warp, blister, scale and carry incrustations of slag, etc., all of which vary the original true form of the crucible. The crucibles are expensive and as the average life of one is only about 30 melts, it is evident that prolonging their life means a very great saving of money.

1,189,356. July 4, 1916. **Electric Furnace.** Peter Eyermann, Witkowski, Austria-Hungary.

This invention relates to electrical furnaces and more particularly to furnaces of this kind for operating on metals, ores or the like.



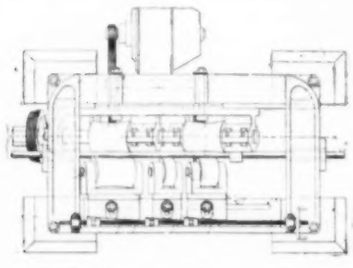
The objects of the invention are to produce an efficient and reliable electric furnace which can be built in large sizes without complicating the construction or reducing the efficiency of operation thereof; also to so mount the crucible of the furnace that it can readily be tilted to completely empty the same.

The accompanying drawing shows a sectional elevation of a furnace embodying the invention.

Briefly stated, the furnace comprises a crucible which is mounted in a supporting frame or cradle and a roof or arch for the crucible supported over the same and through which the electrodes pass, the crucible and roof being so arranged that one is rotatable relative to the other to permit the current from the electrodes to act on different portions of the crucible during the operation of the furnace. In the construction shown the crucible is rotatable relatively to the supporting frame or cradle, and the frame adapted to be tilted to pour the charge out of the crucible.

1,190,698. July 11, 1916. **Method of and Apparatus for Cold-Rolling Metal.** P. B. Abramsen, Knoxville, Pa.

This invention has relation to the art of cold rolling metal rods and round bars; and is designed to provide a simple and effective method by which this work may be accurately carried out with the production of rods and bars free from kinks and bends and objectionable surface markings.

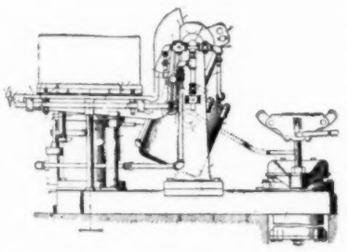


The invention also provides suitable mechanism of simple character and construction, as shown in cut, for carrying out this method.

In accordance with the invention, the previously rolled blanks are subjected to the operation of peculiarly arranged cross rolls. These cross rolls are preferably arranged in two groups or sets, each group or set consisting in two pairs of cross rolls. The first group or set constitutes the reducing and sizing rolls while the second set or group forms the finishing rolls. Corresponding cross rolls in the two sets or groups are rotated in reverse directions. In this manner the finishing rolls remove any surface markings which may be formed by the reducing and sizing rolls.

1,190,951. July 11, 1916. **Molding Machine.** E. H. Pridmore, La Grange, Ill.

This invention relates to molding machines, as shown in cut, of the variety involving a pattern-carrier mounted to be turned from one position in which the mold is rammed, to a position in which the mold is separated from the pattern, and more particularly to that variety of machines wherein jarring-mechanism is provided at the ramming side of the machine for jarring the mold preparatory to inverting the latter, and in which the part carrying the pattern is releasable from the pattern-carrier and when in ramming position, is released from the carrier, and the parts of the machine so arranged that the part carrying the pattern will be spaced at all times during the jarring operation from the carrier and not permitted to strike the latter.

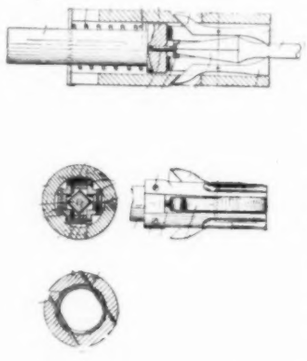


1,191,291. July 18, 1916. **Metal-Pickle and Method of Pickling.** L. C. Drefahl, Cleveland, Ohio, assigner to Grasselli Chemical Company of the same place.

This invention involves the use of cellulose pulp waste in a pickling compound, whether the latter consists of an acid solution or some acid containing salt such as niter cake or the like. This pulp waste may be used in varying amounts since it takes no part in the reaction on the metal, but serves only to produce a heavy foam or lather on the bath when any gas is evolved. Until gas is given off, the pulp waste remains quiescent in the pickling bath, but as soon as any metal articles are put in, and the acid of the solution attacks these articles, the gas given off produces a thick foam on the top of the bath. This foam has but one function, and that is to serve as a filter or blanket for removing the particles of liquid from the gas. In this way the evolution of gas is prevented from causing any spraying or effervescing of liquid, and consequently no injury is done to the surroundings or the operators. As soon as the evolution of gas ceases, the foam disappears, but is at once formed again when more gas is given off.

1,191,797. July 18, 1916. **Tool-Holder.** C. H. Baker, Knowlton, Milwaukee, Wis.

This invention comprehends improvements in tool-holders and relates more particularly to a chuck for holding bits and tools.



One of the objects of the invention is to provide a tool holder of this nature, as shown in cut, which shall be of extremely simple construction, practical, efficient and easy to operate.

Another and more specific object of the invention is to provide a tool holder including a shank, a plurality of arms rigidly secured to the shank, jaws pivoted intermediate their ends between said arms and a slidable sleeve for opening and closing the jaws.

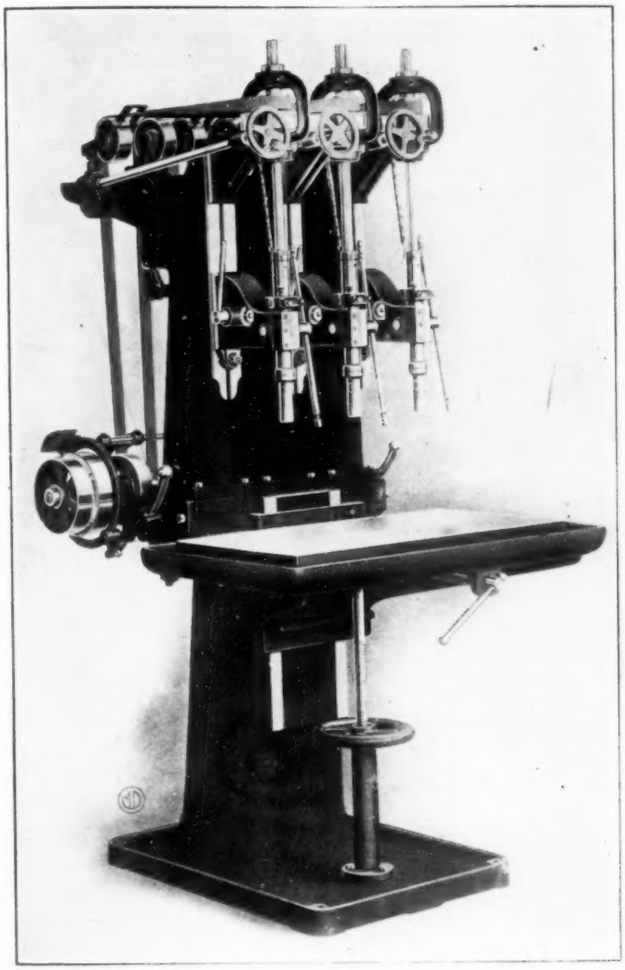
The invention also aims to generally improve devices of this nature to render them more durable, reliable and commercially desirable.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST.

METAL DRILLING MACHINES

The Henry & Wright Manufacturing Company, of Hartford, Conn., makes a line of metal drilling machinery that has occupied a leading position since their first appearance, on account of their high efficiency in operation, advanced design, and mechanical perfection of detail and workmanship. Every year has seen the machines greatly improved as compared with the preceding year, and the many patented features which they embody enable the use of the least belt, the simplest pulleys, and the fewest bearings, and, consequently, they have the lowest cost for upkeep and the widest working range of any drilling machines using a similar amount of power.



A THREE-SPINDLE DRILLING MACHINE USED ON MUNITION WORK. HENRY & WRIGHT MFG. CO., HARTFORD, CONN.

One and one-quarter inch belts are used throughout the machines, and the drilling range is up to ¾ inch for Classes B, C, K and L, and 1⅛ inches for Class I. The new belt shipping device allows the machine to be driven from any degree of the circle surrounding the tight pulley desired. This feature is very handy and important when it is desired to drive the machines from unusual positions. The machines have ball bearings throughout and all the sliding ways and parts that fit them are ground so that an exceptionally high degree of accuracy and interchangeability is maintained.

MOTOR DRIVEN POLISHING LATHE

The illustration shows a motor-driven polishing and buffing lathe made by the Gardner Machine Company, Beloit, Wisconsin. The motors used are of heavy design and are fitted with special end frames carrying high grade ball bearings of ample size. The spindle and in fact all dimensions are of larger sizes than are generally found in lathes recommended for the same service. The motors are fully enclosed, making them absolutely dust and dirt-proof. For ventilation a fan, attached to motor shaft within the cover, draws air up from the base on the right, forcing it through the motor and down into the pedestal on the left. Perfect air circulation is obtained under all normal conditions. The machines

A MOTOR-DRIVEN POLISHING LATHE. GARDNER MACHINE CO., BELOIT, WIS.

are amply powered and under tests the motors have withstood 50 per cent. intermittant overloads of considerable duration.

The push button control station is a very effective and convenient feature furnished on all these machines. The button on the right is used for starting and is below the surface of the plate so as to remove any liability of accidental starting. The left hand or stopping button is provided with a simple locking device which is a further precaution against closing the circuit unintentionally.

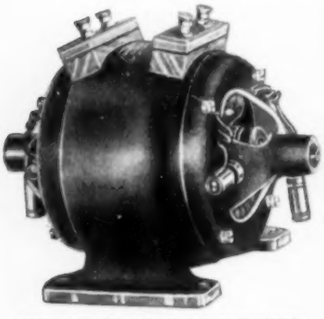
Either adjustable or constant speed direct current motors can be furnished when adjustable speed is used, the lever within the base is moved to the desired point, and by pressing the starter button the motor comes up to the speed at which it is set. In alternating current only certain speeds are obtainable. The spindle is supplied with a locking device. A button head pin, acting over a coil spring, is pushed down into one of the four holes in the spindle collar shown. This locks the spindle when it is desired to change wheels. These machines are made in several different sizes.

ELECTRIC FOUNDRY VIBRATORS

The Magnetic Manufacturing Company, Milwaukee, Wis., has just issued bulletin No. 5, in which they describe their type A vibrators for benches and hand squeezers used in every day foundry practice. The manufacturers say of their vibrators as follows:

"Our type A vibrators with switch attached showing mode of attaching to power system by means of our three wire plug and receptacle mounted on outlet box cover. This style of apparatus is suitable for use on benches and squeezers and heavy moulding machines. Our type A vibrator with hand switch used on roll-over machines or where workman wishes to operate vibrator on a remote or moving part of machine. A knee switch may be used in place of a hand switch if desired. With this equipment it is possible to mount a vibrator in most effective position on moulding machines and locate the hand or knee switch in most convenient place for operator.

All type A vibrators are furnished with five feet of flexible connecting cord and tubing, with attachment plug and receptacle mounted on four-inch outlet box cover. Longer lengths of flexible tubing and cord can be furnished, but will be charged for as extra at market price. As weight is no objection in this type of vibrator, we are able to construct them for handling very heavy work.



THE GENERATOR CONVERTER.

TYPE A VIBRATOR FOR BENCHES AND HAND SQUEEZERS.

Our electric vibrators are free from oil, grease or water, as it is not necessary to use either in operating same. Workmen are not annoyed by getting hands and clothing smeared with oil or grease. In addition to its economical value, this feature of cleanliness is very highly appreciated by operators. Flexibility is another great advantage in favor of the electric vibrator. The wires may be run at any angle or curve without affecting the working of the vibrators. With air, the pipes must be installed without pockets to hold water, and be arranged so that they will automatically drain themselves. Electric vibrators may be located any distance from power supply without loss, by using the proper size feeder wires.

TYPE P VIBRATOR AND ATTACHMENT PLUG.

One of our hand or knee type switches is used with each vibrator and, like all other appliances, they are built on honor and are made as nearly "fool proof" as possible. They have ample carrying capacity. There are four contacts of bronze and copper that close and open the circuit simultaneously, has a quick brake and it is impossible for the workman to open the circuit slowly. The terminals are protected by metal covers held in place by two screws making them very accessible to disconnect. The contacts are also accessible simply by removing two screws."

CRUCIBLE PRESERVER.

In these days of feverish activity in the casting shops and foundries or in any place where crucibles are employed for the melting of metal, any means by which the operating expense may be reduced is a matter of vital interest to the metal manufacturer. A material which, although it has been on the market for the past few years, has only lately swung into the limelight, is known as Feurit and is used for coating crucibles inside and out before they are used for melting purposes. Naturally before a material of the character of Feurit is accepted by the metal trades as fulfilling the claims made for it by its manufacturers, it must go through the baptism of fire. This ordeal has been successfully experienced by Feurit, so we are told by the manufacturers, and their claims are amply substantiated by the fact that extensive repeat orders for the material are being received. Feurit, as its name implies, is a material capable of withstanding high temperatures and is composed of a base substance which is imported from abroad and mixed up with other materials obtained in this country. The method of using Feurit is to mix one gallon or 10 pounds by weight of silicate of soda (40° Be.) and 5 pounds of Feurit and stir until a smooth mixture free from lumps and particles of dry powder is obtained. For obtaining the best results it is recommended that two coats of the mixture are applied to the surface to be protected, allowing one hour between coats and 12 hours before applying heat.

The applications of Feurit are quite varied, a few of which are included in the following: Foundries—Coating firebrick in annealing furnaces, cupolas and melting furnaces; as a binder for firebrick; for coating crucibles. Potteries—For firebrick in mouths, bags and arches of kilns; for coating and mending saggers; for pointing up cracks in decorating kilns. Jewelers—For coating cylinders, shoulders, supports, fireclay burners and covers of gas furnaces; for coating crucibles.

One of the most interesting uses to which Feurit is applied at the present time is that in the protection of crucibles, which are not only hard to get but also very high in price, and a brief report of results which have been obtained by a large concern will be of interest. This company found that a No. 100 crucible lasted for 20 heats under normal conditions. Costing $5, the cost per heat was 25 cents. Two coats of Feurit, inside and out, cost 12 cents per coat, making total cost of crucible with two coats $5.24. Coated crucibles lasted on an average 30 heats, thereby reducing cost per heat from 25 to 17½ cents. In other words, Feurit results in a saving of over 7½ cents per heat, or about 33 per cent. of the total crucible cost. According to many concerns a saving of 50 per cent. of total cost of crucibles is not unusual. In short, Feurit will save from $30 to $50 on every $100 now paid for crucibles.

Feurit is manufactured by H. H. Jarrett & Company, Feurit Department, 120 Liberty street, New York.

METALLIC CRUCIBLES

An entirely new development in the melting of metals is being pursued by the Drivir-Harris Wire Company of Newark, N. J., by means of their Nichrome metal crucibles.

Some very interesting results have been obtained from crucibles made to hold up to 175 pounds of metal and various metals have been melted to observe the effect which they had on the crucible. Brass, copper and phosphor copper have been melted, without the crucible showing any signs of deterioration. This is very important when we consider that phosphor copper has a corroding action on most all types of crucibles.

Tests made in No. 40 to No. 50 crucibles (the crucibles hold about 3 pounds to a number, thus No. 50 holds about 150 pounds), showed that metals could be melted quickly. Melts were made in about 40 minutes and required no especially careful handling or preliminary seasoning. The tests on the crucibles have not been entirely completed and it will be some time before the company will place them generally on the market.

COPPER BAND TURNING LATHE

By M. Jenckes, Jenckes Machine Company, Ltd., Sherbrooke, Quebec

The machine shown in the illustration is a single purpose lathe for turning copper bands of British shell. The lathe is made for 8, 9.2 and 12-inch size shells.

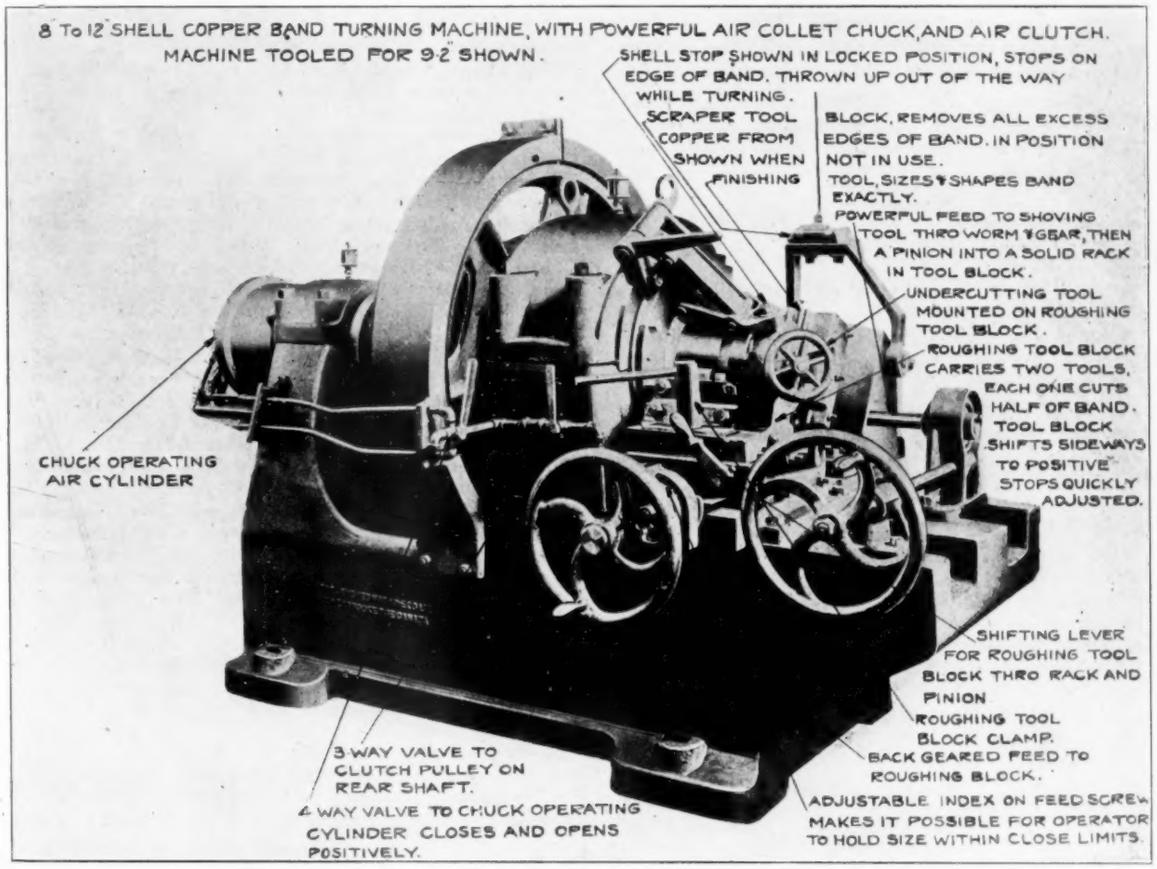
The tool arrangement for this work is extremely rugged and massive. The main slide casting is bolted securely to the base by means of 6 studs and is not adjustable. The bed is deep and wide, of heavily ribbed box section which extends to the rear and supports the main driving shaft and pinion.

The rough shaping of the band is accomplished by means of two formed tools of High Speed Steel. These tools are comparatively long lived, as they are ground on end to sharpen, which does not change their shape. Each of the tools are held securely in dove-tailed fits in the steel tool block by two ¾-in. taper head bolts. Both tools are further supported by means of an adjustable jack so that the clamping effect of either tool helps to hold the other, and permits removing and replacing the tools with precision, after grinding. Each tool cuts approximately one-half of the band width. The tool block has a quick and convenient shift sidewise by means of a rack and pinion and is located accurately by a single stop rod and lock nuts. An accurate method of determining the depth of the cut is provided by means of a graduated dial, and two adjustable pins, which can be screwed in or out, and which show flush with the face of the feed screw housing when that tool has aproached the depth of cut. The exact depth is determined, however, by means of a pointer and the adjustable dial which makes it possible for the operator to hold the cut within close limits. A very powerful feed has been provided for these tools, as the machine is fitted with a 15-in. hand wheel geared 2 to 1 through a 4 pitch screw.

The under-cutting operation is by means of a separate tool and block mounted on the main or roughing tool block. This is in line with the undercut when the tool nearest the base of the shell has finished its cut, and has been slightly withdrawn. This is a powerful tool and provided with an adjustable stop.

Finishing: The band is finally finished by means of a shaving tool which is arranged to feed down an incline block at the rear of the shell. This block is slightly adjustable to or from the shell, and means are also provided to rotate this block slightly to vary the diameters of the band at either end. The feed of this tool is through rack and pinion on the block and thence through worm and gear to the hand wheel at the front of the machine at the operator's right hand. The tool for this work is of High Speed steel with the face milled to the exact contour of the finished band. It is located in the slide by a dovetail the full length of the tool and held securely by a clamp and two bolts. The tool is sharpened by grinding on one end. A double scraper tool is attached to this back tool block and is adjustable sidewise to bring it into fixed alignment with the finishing tool. The two scraper tools are set in slots in this tool block the correct distance apart for the width of the band. Each tool is adjustable by means of a set screw, so that they can be made to come down close to the shell without actually cutting the steel. An adjustable brass stop pin is also located in this block and it is the relative length of this brass block bearing on the shell prevents the tools cutting the steel. This tool block is counterbalanced and swung up out of the way when a shell is being put into, or removed from the machine.

The shell is located in the chuck by means of a swing stop attached to the cap above the spindle. This stop swings down and is located in position by means of a toggle lever, and the shell pulled back until the band bears against the stop, after which the operator turns on the air to close chuck, swings the stop up out of the way, turns the air on the clutch pulley which starts the machine, and proceeds to feed in the roughing tools.


8 To 12 SHELL COPPER BAND TURNING MACHINE, WITH POWERFUL AIR COLLET CHUCK, AND AIR CLUTCH.
MACHINE TOOLED FOR 9·2 SHOWN.
SHELL STOP SHOWN IN LOCKED POSITION, STOPS ON EDGE OF BAND. THROWN UP OUT OF THE WAY WHILE TURNING.
SCRAPER TOOL COPPER FROM SHOWN WHEN FINISHING
BLOCK, REMOVES ALL EXCESS EDGES OF BAND. IN POSITION NOT IN USE.
TOOL, SIZES & SHAPES BAND EXACTLY.
POWERFUL FEED TO SHOVING TOOL THRO WORM & GEAR, THEN A PINION INTO A SOLID RACK IN TOOL BLOCK.
UNDERCUTTING TOOL MOUNTED ON ROUGHING TOOL BLOCK.
ROUGHING TOOL BLOCK CARRIES TWO TOOLS, EACH ONE CUTS HALF OF BAND.
TOOL BLOCK SHIFTS SIDEWAYS TO POSITIVE STOPS QUICKLY ADJUSTED.
CHUCK OPERATING AIR CYLINDER
SHIFTING LEVER FOR ROUGHING TOOL BLOCK THRO RACK AND PINION
ROUGHING TOOL BLOCK CLAMP.
BACK GEARED FEED TO ROUGHING BLOCK.
3 WAY VALVE TO CLUTCH PULLEY ON REAR SHAFT.
4 WAY VALVE TO CHUCK OPERATING CYLINDER CLOSES AND OPENS POSITIVELY.
ADJUSTABLE INDEX ON FEED SCREW MAKES IT POSSIBLE FOR OPERATOR TO HOLD SIZE WITHIN CLOSE LIMITS.

8 TO 12-INCH SHELL COPPER BAND TURNING MACHINE WITH POWERFUL AIR COLLET CHUCK AND AIR CLUTCH.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS.

AMERICAN INSTITUTE OF METALS

President, Jesse L. Jones, Pittsburgh, Pa. Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The 1916 convention will be held in Cleveland, Ohio.

Secretary Corse announces the tentative program as to papers to be read before the convention as follows:

A. F. Taggart, Hammond Laboratory, New Haven, Conn.: "Reclamation of Metallics from Foundry and Manufacturing Plants' By-Products."

J. M. Bateman, Western Electric Company, Cleveland, O.: "Methods of Selling Non-Ferrous Scrap, as Pursued by a Large Producer."

F. L. Antisell, Raritan Copper Works, Perth Amboy, N. J.: (Subject to be announced.)

Bureau of Standards, Washington, D. C.: 1.—Results of joint work of casting and testing 88-10-2 by five foundries. 2.—Report on use of Deoxidizers of Bronzes. 3.—Report on aspects of Works of Bronze Failures.

W. M. Corse, Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.: "Copper-Aluminum-Iron Alloys."

W. B. Price and P. H. Davidson, Scovill Manufacturing Company, Waterbury, Conn.: "Tests on Rolled Brass Sheets, Taken in Direction of Rolling, and at Right Angles to the Direction."

S. W. Miller, Rochester Welding Company, Rochester, N. Y.: "Application of Oxy-Acetylene Welding Process on Repairing Defective Non-ferrous Castings."

A. D. Flinn, Board of Water Supply, New York, N. Y.: "Continuation of Discussion in Connection with Defective Bronze Castings in Use by the Board of Water Supply of New York City."

Chas. Pack, Doehler Die Casting Company, Brooklyn, N. Y.: "Evolution of Die Casting Process."

C. H. Bragg, Ohio Brass Company, Mansfield, O.: (Subject to be announced.)

General Electric Company, Laboratories "D": "Disclosure of Blow-Holes by Means of X-Ray Apparatus."

P. E. McKinney, U. S. Navy Yard, Washington, D. C.: "Aluminum Castings and Forgings."

G. V. Ceaser and G. C. Gerner, Hammond Laboratory: "Annealing Properties of Copper."

W. W. Arthur, Frankford Arsenal, Frankford, Philadelphia: "Paper on Metallography as Applied to Non-ferrous Metals."

G. C. Holder, American Optical Company: "Heat Treatment of German Silver."

Mr. Barnes, Fort Wayne Electric Company: Paper for Brass Foundrymen's Day.

Mr. Sleeth, Westinghouse Company: Paper for Brass Foundrymen's Day.

For Joint Session:

C. D. Chase, Modjeski & Angier Company, Chicago, Ill.: "Results of Closer Co-operation of Engineer and Foundry as Relating to Non-ferrous Metals."

R. R. Clark, Pennsylvania Lines West, Allegheny, Pa.: "Gating."

AMERICAN FOUNDRYMEN'S ASSOCIATION

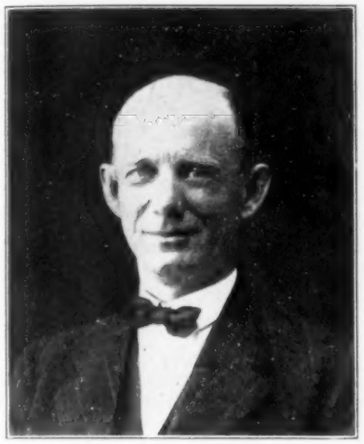
The list of exhibitors to date for the convention at Cleveland, Ohio, September 11-16, 1916, is as follows:

Amalgamated Machinery Corporation, Chicago, Ill.; American Gum Products Co., New York, N. Y.; Arcade Mfg. Co., Freeport, Ill.; Armstrong Cork Co., Pittsburgh, Pa.; Atkins, E. C., & Co., Indianapolis, Ind.; Ayer & Lord Tie Co., Chicago, Ill.; B. & B. Mfg. Co., Indianapolis, Ind; Berkshire Mfg. Co., Cleveland, O.; Besly, Chas. H., & Co, Chicago, Ill.; Birkenstein, S., & Sons, Chicago, Ill.; Blystone Mfg. Co., Cambridge Springs, Pa.; Brass World Publishing Co., New York, N. Y.; Brown Specialty Machinery Co., Chicago, Ill.; Carborundum Co., Niagara Falls, N. Y.; Cataract Refining & Mfg. Co., Buffalo, N. Y.; Chicago Pneumatic Tool Co., Chicago, Ill.; Cincinnati Pulley Machinery Company, Cincinnati, Ohio; Cleveland Blow Pipe & Mfg. Co., Cleveland, O.; Cleveland Pneumatic Tool Co., Cleveland, O.; Cleveland Wire Spring Company, Cleveland, Ohio; Coale, Thomas E., Lumber Co., Philadelphia, Pa.; Curtis Pneumatic Machinery Co., St. Louis, Mo.; Dalton Adding Machine Company, Cincinnati, Ohio; Davis-Bournonville Co., Jersey City, N. J.; Dixon, Joseph, Crucible Co., Jersey City, N. J.; Electric Controller and Mfg. Co., Cleveland, Ohio; Excelsior Tool & Machine Co., East St. Louis, Ill.; Federal Foundry Supply Co., Cleveland, O.; Felt & Tarrant Mfg. Co., Chicago, Ill.; Gardner Machine Co., Beloit, Wis.; General Electric Co., Schenectady, N. Y.; Gibb Instrument Co., Pittsburgh, Pa.; Gisholt Machine Co., Madison, Wis.; Goldschmidt Thermit Co., New York, N. Y.; Gordon Sand Co., Conneaut, Ohio; Graceton Coke Co., Graceton, Pa.; Great Western Mfg. Co., Leavenworth, Kans,; Hardy, F. A., & Co., Chicago, Ill.; Harris, Benjamin, & Co., Chicago, Ill.; Houck Mfg. Co., Brooklyn, N. Y.; Herman Pneumatic Machine Co., Pittsburgh, Pa.; Herold Bros. Co., Cleveland, O.; Hill-Brunner Foundry Supply Co., Cincinnati, O.; Hill & Griffith, Cincinnati, Ohio; Hovel Mfg. Corporation, New York, N. Y.; Ingersoll-Rand Co., New York, N. Y.; Iron Age, New York, N. Y.; Jennison-Wright Co., Toledo, O.; King, Julius, Optical Co., New York, N. Y.; Lehigh Coke Co., South Bethlehem, Pa.; Lincoln Electric Co., Cleveland, O.; Lupton's, David, Sons Co., Philadelphia, Pa.; McCormick, J. S., Co., Pittsburgh, Pa.; MacLean Publishing Co., Toronto, Ont.; Macleod Co., Cincinnati, O.; Mahr Mfg. Co., Minneapolis, Minn.; Malleable Iron Fittings Co., Branford, Conn.; Manitowoc Electric Implement Co., Manitowoc, Wis.; THE METAL INDUSTRY, New York, N. Y.; Midland Machine Co., Detroit, Mich.; Moldar Co. (Richey, Browne & Donald), Maspeth, N. Y.; Moltrup Steel Products Co., Beaver Falls, Pa.; Monarch Engineering & Mfg. Co., Baltimore, Md.; Motch & Merryweather Machinery Co., Cleveland, O.; Mott Sand Blast Mfg. Co., Chicago, Ill.; Mumford, E. H., Co., Elizabeth, N. J.; National Engineering Co., Chicago, Ill.; New Haven Sand Blast Co., New Haven, Conn.; Norma Co. of America, New York, N. Y.; Norton Co., Worcester, Mass.; Obermayer, S., Co., Chicago, Ill.; Oliver Machinery Co., Grand Rapids, Mich.; Osborn Mfg. Co., Cleveland, O.; Oxweld Acetylene Co., Chicago, Ill.; Pangborn Corporation, Hagerstown, Md.; Penton Publishing Co., Cleveland, O.; Pickands, Brown & Co., Chicago, Ill.; Portage Silica Co., Youngstown, O.; Pridmore, Henry, E., Chicago, Ill.; Pyrotectite Co., Chicago, Ill.; Robeson Process Co., New York, N. Y.; Rogers, Brown & Co., Cincinnati, O.; Sand Mixing Machine Co., New York, N. Y.; Sly, W. W., Mfg. Co., Cleveland, O.; Smith Facing & Supply Co. Cleveland, O.; Smith, R. P., & Sons Co., Chicago, Ill.; Smith, Werner G., Co., Cleveland, O.; Snyder Electric Furnace Co., Chicago, Ill.; Standard Sand & Machine Co., Cleveland, O.; Sterling Wheelbarrow Co., West Allis, Wis.; Stevens, Frederic B., Detroit, Mich.; Strong, Kennard & Nutt Co., Cleveland, O.; Sullivan Machinery Co., Chicago, Ill.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST.

WILLIAM H. CARPENTER



W. H. CARPENTER.

William H. Carpenter, of Woodland street, Bristol, Conn., who has been general manager of the plant of the Mayo Radiator Company in New Haven for the last seven months, has tendered his resignation to accept a responsible place in a managerial capacity with the Seymour Manufacturing Company, of Seymour, Conn., manufacturers of brass products. Mr. Carpenter was formerly employed by the Seymour Manufacturing Company, working there from 1878 to 1880, when he went to the Bristol Brass Company, Bristol, Conn., where he remained until December, 1915. From the Bristol Brass Company he went to the Mayo Radiator Company. Mr. Carpenter is one of Bristol's best known citizens and is very popular. He is a member of Bristol Lodge, No. 1010, B. P. O. E., and of several other local organizations.

E. A. Moore, formerly superintendent of the Fairbanks-Morse Manufacturing Company, Beloit, Wis., and previously with the Bullard Machine Tool Company, has become works manager of the Union Switch and Signal Company, Swissvale, Pa.

James H. Zeller, until recently production engineer with the American Bronze Company, Berwyn, Pa., has become associated with the Penn Barrel Company, Philadelphia, Pa., where he will act as assistant superintendent.

Charles Pascoe, former metallurgist for the Canadian Steel Foundries, Ltd., and recently connected with the Thomas Davidson Manufacturing Company, Ltd., of Montreal, Canada, as consulting metallurgist, has joined the Snyder Electric Furnace Company, of Chicago, Ill., as metallurgist in that company's electric furnace research plant, at Clearing, Ill.

R. E. Massicotte, who has been connected with the Mitchell-Vance Company, New York, N. Y., for a long time as foreman of the plating department, reports that the company is now working in most departments both night and day, and that there are sufficient orders on the books to continue at the present rate of activity for the rest of the year.

C. B. Willmore, one of the authors of THE METAL INDUSTRY and son of H. E. Willmore, secretary of the Crown Rheostat Company, Chicago, Ill., graduated last June from the University of Wisconsin, Madison, Wis., in the course of chemical engineering. Mr. Willmore is now connected with the Anaconda Copper Company, Anaconda, Montana, in the chemical laboratory.

Charles E. Robinson celebrated his eightieth birthday on July 30, 1916. Mr. Robinson was in business in New York for forty years and during that period was connected with several of the trade journals and widely known among them. For a number of years he was on the staff of THE METAL INDUSTRY in the financial department. At present he is living in Newport, R. I., with his son, Dr. E. P. Robinson, and is enjoying a well earned rest.

DEATHS.

ERNEST A. LEWIS

Ernest A. Lewis, a well known metallurgist of Birmingham, England, died at his home in that city, on June 24, 1916. Mr. Lewis was born at Rugby, England, in 1878, and moved to Birmingham with his parents when he was four years old, where he obtained his education, which included attendance at Mason College (now the Birmingham University) and evening classes in metallurgy at the Birmingham Municipal Technical School.

ERNEST A. LEWIS

Mr. Lewis was chemist and metallurgist at the Muntz's Metal Company, Limited, French Walls Works, near Birmingham, England, for seven years. Leaving here in 1903, he went to the locomotive department of the Midland Railway Company at Derby, where he reorganized the brass foundry and systematized the practice in the use of alloys on locomotives. Since 1905, Mr. Lewis has been in business as an analytical and consulting chemist and metallurgist, with a special reference to brass and copper alloy work.

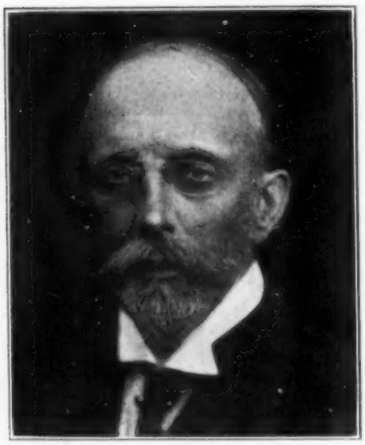
Mr. Lewis has been a frequent contributor to both the American and English editions of THE METAL INDUSTRY and has written several papers on copper and its alloys. He was a "Fellow of the Chemical Society" of London and a member of the "Society of Chemical Industry" and the "Society of Public Analysts and other Analytical Chemists," and also of the British Institute of Metals.

Andrew Andrews, who two years ago celebrated the anniversary of his fifty years of service with the silver company, which is now a part of the International Silver Company, Wallingford, Conn., died on June 29. Mr. Andrews was 80 years of age, and his service of 52 years was with Simpson, Hall & Miller, which now is Factory L of the International company. He had also been secretary of the Simpson Nickel Company and became its president in 1894, continuing until the amalgamation came in 1898. Mr. Andrews was the head of Factory L and a director of the International company. He leaves a wife, three sons and a daughter.

Harry E. Flewellin, who was connected with the sales department of the International Nickel Company for twelve years, died in Caldwell, N. J., June 26. He had been in ill health for nearly two years.

CHARLES W. H. KIRCHHOFF

Charles W. H. Kirchhoff, for thirty-six years editor of the "Iron Age," a former president of the American Institute of Mining Engineers and a noted engineer, died on July 22 at North Absury Park, N. J., at the age of 63.



CHARLES W. H. KIRCHHOFF.

Mr. Kirchhoff was born in San Francisco, Cal. He attended school in this country and Germany, and was graduated from the Royal School of Mines, at Clausthal, Germany, in 1874, taking the degree of mining engineer and metallurgist. During the next three years he was chemist, assayer and assistant superintendent of the Delaware Lead Mills at Philadelphia, Pa.

Beginning his career in technical journalism in 1876, when he was correspondent of English, German and Capetown, Africa, papers, he became connected with the "Metallurgical Review" in 1877, and a little later joined the staff of the "Iron Age," leaving it for a time to be managing editor of the "Engineering and Mining Journal," but returning in 1884. Four years later he became its editor in chief and vice-president of the David Williams Company, publishers of the periodical.

He was a one time a special agent of the United States Geological Survey for the collection of statistics of the production of copper, lead and zinc. He was a member of the Iron and Steel Institute, was once resident of the Germania Club and was a member of the American Society of Mechanical Engineers, the Century and Engineers Club. He is survived by his wife.

COL. C. L. F. ROBINSON

Colonel Charles L. F. Robinson, president of the Colt Patent Fire Arms Manufacturing Company, of Hartford, Conn., died suddenly July 6 aboard his yacht, off Newport, R. I. He was born July 9, 1874, in Sayville, Long Island. At the time of his death, he had been a resident of Hartford for ten years and for several years had been at the head of the Colt company. He was a director of the Newport (R. I.) Trust Company, the American Hardware Corporation of New Britain, Conn.; the Standard Wrench Company of Providence, R. I.; the Shore Line Electric Railroad Company, and the following Hartford institutions:

CHARLES L. F. ROBINSON.

The Fidelity Trust Company, the Phoenix National Bank, The Connecticut Trust & Safe Deposit Company, the Hartford Fire Insurance Company, and the Travelers Insurance Company. He was elected last month as secretary of the Rhode Island Society of the Cincinnati, and was a member of the New York Yacht Club, the Royal Thames Yacht Club of England, the Imperial Yacht Club of Germany, and the Royal Yacht Club of Belgium. From 1900 to 1903, he was a member of America's cup committee. His clubs included the Farmington Country Club, the Dauntless Club of Essex, the Hartford Club, the Hartford Golf Club, the Metropolitan Club of Washington, D. C., and the Brook Clubs of New York. He is survived by his wife, two sons and a daughter.

Francis E. Parker, for thirty-five years connected with the Plume & Atwood Company, manufacturers of brass goods at Waterbury, Conn., died July 2 at a hospital in Boston, Mass., from which he had been taken from Littleton, Mass. Mr. Parker was in his sixty-ninth year and was born in Thomaston, Conn. He is survived by his wife and three sons.

Charles B. Manchester, for 30 years overseer at the American Screw Company, Providence, R. I., and later proprietor of the C. B. Manchester Gas Furnace Company, also of Providence, died July 12 at his home, after a short illness. Mr. Manchester was born in New Hartford, Oneida County, N. Y., and at the time of his death was in his seventy-first year.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS.

NEW BRITAIN, CONN.

AUGUST 7, 1916.

Never have New Britain's metal manufacturing industries passed a busier summer than the one of the present year. Past years have seen shorter working hours and more holidays, but not so this year. Full working schedules have been maintained and there seems to be no indication of any falling off. The business seems to be fairly well distributed about the various concerns here. At the Landers, Frary & Clark factory ground has already been broken for the addition of another factory building and a big addition at the Union Manufacturing Company is just being occupied. In addition to this plans are being made for the occupation of the Hartford Auto Parts factory here next month by the B. & K. Company, formerly Barnes & Kobert, of Milldale. That concern is already advertising for mechanics to man their new plant.

The North & Judd Manufacturing Company still continues to do a booming business and at a recent meeting it was voted to put the stock permanently on a sixteen per cent. basis, dividends payable quarterly. The only change in the directorate was the election of Charles Glover in place of Charles F. Smith, who recently resigned. Active work is to be started immediately on the construction of a new electric power plant at this concern. Heretofore the power has been about 55 per cent. direct drive, but with the completion of the new power plant about March 1 each department will be driven separately from singles motors and the factory will be one of the most modern in the East. The plant is to be operated by two massive turbine engines, each rated at 750 k.w. and two 500 h.p. boilers. In addition to other contracts, the North & Judd Manufacturing Company expects to get some big government orders before long. With the increase of the army and the purchase of additional army horses, equipment will be needed and as this concern deals particularly in this saddlery hardware and harness trappings it is expected that they will profit thereby. Several new inventions in buckles have recently been put on the market by this concern. So good is business that the employees are now working on a bonus system.

The Union Manufacturing Company is also rushed with orders, but prosperity here seems to spell impending labor trouble. Although the directors have dealt generously with their employees

and have given them the benefit of a bonus system in addition to their regular pay, they still demand more. During the past month the moulders have twice gone out on a strike for this very reason. President A. F. Corbin does not view the situation with any degree of alarm, however, and thinks that conditions will soon readjust themselves.

Many of the concerns are being hindered somewhat in supplying their customers because of the country-wide freight tie-up. At the Corbin Screw Corporation particularly, although business is good, the firm is held back because of inability to get shipments of raw stock. The Stanley Works, another busy concern, is handling about all the business it can at present and is likewise hampered by freight conditions.

Now that the summer is half gone the manufacturers, who have been worrying lest they be confronted with serious labor trouble, are beginning to breathe a little easier. As yet there has been only three or four strikes of a minor nature, and these among the moulders, so there appears at present to be but little danger of a wide-spread strike among the skilled workmen. —H. R. J.

HARTFORD, CONN.

AUGUST 7, 1916.

In order to create additional floor space, which is greatly needed by the company while waiting for the completion of its new factory addition, the Maxim Silencer Company has resorted to the novel plan of erecting a large tent in an open lot just in front of the present factory on Homestead avenue, where the welding department will be located probably until October 1. The company now occupies the upper floor of a new building owned by the City Coal Company and the present working floor space is 7,500 square feet. This was sufficient for its purposes at the time the company moved into the building a short time ago, but the demand for the product of the factory has grown so fast of late that that amount of floor space is far short of what is needed.

Work was started a month ago on a new factory addition to be occupied by the Maxim Silencer Company. On account of the shortage of steel needed in the construction of the new building, the contractors have been obliged to notify the company that the work would be seriously delayed. The tent is thirty by fifty feet, giving 1,500 square feet of additional space. In size and shape it resembles the dining tent of a circus. The sides are seven-foot walls of canvas, which are let down a few inches from the top in the present hot weather to supply ventilation. Electric and oxy-acetyline welding is done in the tent, feed wires from the main factory being the only connections necessary.

Another change at the Maxim factory is the removing of the general offices from the main factory building to a house at Nos. 81 and 83 Homestead avenue. The new factory addition will provide 18,000 square feet of additional space. A bridge will be built to connect the factory buildings with the office building and alongside of it will be a shooting range for the testing of the Maxim silencing devices. At present, the officers of the company contemplate putting up another building in the lot now occupied by the temporary tent.

Although the metal industry in Hartford is flourishing at present, it is not receiving as much attention at present as was the case during the winter months, probably because the orders which are being received now are not as large as those which came in then. The larger of the factories are busy filling the exceptionally large orders which came in just before New Year's and which were reported in THE METAL INDUSTRY.

Colt's Patent Fire Arms Manufacturing Company expects to get a large government order for machine guns as soon Congress passes the necessary appropriation. President W. C. Skinner, who was recently elected president after the death of Colonel Charles L. F. Robinson, has been to Washington frequently during the past few weeks conferring with the army authorities regarding the matter.—T. C. W.

PROVIDENCE, R. I.

AUGUST 7, 1916.

The manufacturers and handlers of all lines of metal throughout Rhode Island continue to report the carrying on of business at top speed. Practically all of the plants, with the exception possibly of the manufacturing jewelry and allied lines, are weeks behind on deliveries. This includes the machine tool makers, the machinery builders, the foundries, the munition makers, sheet metal workers and in fact all other branches of the industry. The search for competent help continues, but is not meeting with any very sanguinary success. The shortage of help is a decided factor in the manufacturing proposition of today and has been for nearly a year and a half. No man who is at all capable and desirous of work is out of a job, yet the demand constantly increases for more men.

The jewelry manufacturers, even in the midst of the summer vacation period, are finding a fair amount of business, that is said to be profitable at the present time and promising encouraging possibilities for the fall trade. About one-half of the factories have had or are having their annual vacations, which have had a tendency to slacken the entire market to a considerable extent. It is freely predicted, however, that when the travelers go out on their next trip they expect to send home great batches of orders for, as one old-timer puts it, "the country is ripe for a big jewelry year."

The Rhode Island Welding Company, corner of Promenade and Park streets, this city, is being conducted by William G. Winsor, Jr., of 158 West avenue, Pawtucket, according to his statement filed at the office of the city clerk.

The Providence Co-operative Sheet Metal Company have started work on the sheet metal work for the Peck Memorial School building at Barrington, R. I., and also for the remodeled Hotel Dreyfus in this city.

The American Emery Wheel Works has been granted permission to erect a one-story storage building, of iron and concrete construction, at its plant on Pitman street.

According to the officials of the Mossberg Wrench Company, Central Falls, R. I., the concern has more orders than can be filled for a long time. A full time schedule is being maintained, and the plant is being operated with a full complement of men.

Ground has been broken for the first building for the United Wire & Supply Company's new plant at Elmwood avenue, Cranston, near the site of the Standard Machinery Company. It is to be two stories of brick, 200 by 300 feet.

Agnes E. Jurgens, James E. Brothers and Charles E. Irwin have been granted articles of incorporation under the laws of Rhode Island to manufacture and sell jewelry with a capital stock of $10,000 under the style of the A. C. Jurgens Company.

At a recent meeting of the stockholders of the Potter & Buffinton Company, manufacturing jewelers, it was voted to increase the capital stock of the corporation from $250,000 to $400,000, to be divided into three classes—first preferred, second preferred and common.—W. H. M.

BUFFALO, N. Y.

AUGUST 7, 1916.

The metal trade in this market is slightly better than it was a month ago, particularly is this so about the fore part of the month, and from the present volume of orders on hand none of the local tradesmen will not want for some time. Toward the latter half of the month orders began to fall off, but this did not disturb the market very much, as there was a sufficient number of orders on hand.

But in spite of this brisk trade which the local men have enjoyed during the last few months, collections are said to be very poor. Everyone seems to hold up on the payment of their goods. This sort of practice makes it rather difficult for the smaller dealers to finance themselves and others.

The foundries continue to enjoy a fine volume of business. The only thing that is the source of much difficulty for them is the scarcity of labor. Nearly all of the foundries are having considerable difficulty in getting a sufficient number of molders. This has resulted in a general slowing up in the volume of output which they might otherwise produce. The labor element, it is found, has developed into an almost serious problem. Men are difficult to get, and maximum wages are being paid, and as one gentleman put it: "This is the laboring man's day and he is going to make the most of it."

It has been predicted by the foundrymen that we shall see a slight falling off in business within a short time. This, they believe, will be but temporary.

The terrific heat wave which swept over this city during the latter half of July has been a source of hardship on the men working in the foundries. It was exceedingly trying at times for these men to work with great energy. Between this and the labor troubles the foundrymen have been hampered very much.

The Unique Brass Foundry Company reports business as being very good.

The American Bronze Company, who are very busy, report that they are having an unusual amount of difficulty in getting molders.

The Aluminum Casting Company are erecting a new office building on Elmwood avenue, 30 x 30 x 12 feet, which is to cost $2,200.

Pratt & Letchworth Company are making a one-story steel, brick addition to their foundry to cost $14,500.

The National Bronze Company is making quite a few very large castings.

Schnell Bronze Bearing Company is making a large number of bearing castings for the local rubber reclaiming company.

The platers are enjoying equally as good a volume of business as are the foundrymen. But they say that very few new orders are coming in. This evidently means that the trade will shortly experience a setback. Most of the orders on which they are working are those upon which they have been engaged for some time past.

The Washington Plating Works, who have been doing considerable work for the Curtiss Aeroplane Company, report that they recently performed a very satisfactory experiment for the Curtiss people. The Curtiss people wanted them to plate all parts with a rustless nickel which could stand salt or sea water. This is the test the plating underwent: After having been plated the sample was placed in 20 per cent. hot salt water for 14 hours, then it was dried, and was placed in 5 per cent. hot salt water for eight hours, then exposed to the air for eight hours. This was repeated three times and then finally it was placed in a 2 per cent. vinegar solution for eight hours and then dried. After this severe test the nickel was as good as ever, and as a result the Curtis people were so pleased that a large order will be placed with this firm.

Fries Plating Company reports that they are very busy filling their old orders, but that there is but little new business coming in.

There is little or no difference in the finishing and rolling mills, and they continue to be crowded with war orders.

The Barcalo Brass Bed Manufacturing Company is making a $23,000 reinforced concrete addition to its present establishment.

The Buffalo Metal Goods Company is making a $1,000 addition to its present quarters.

G. W. G.

NIAGARA FALLS, N. Y.

August 7, 1916.

When all things are taken into consideration the Cataract City is enjoying one of the finest seasons in its history. Everywhere one is able to find either foundry or factory as busy as can be, and, judging from the present volume of business which they have on hand, they will be kept busy for some months to come. This year from the very start has been a very remarkable one with the local men. Each month almost a new concern is added to the list of local non-ferrous metal men. If they do not locate on the American side they locate on the Canadian side of the river.

The local men are very much wrought up over the fact that one of the local concerns has been placed on the blacklist by the Britsh Government. This action of the Britsh Government in placing the Electro Bleaching Company came as a big surprise both to the officials of the company and the electro chemists of Niagara Falls, who are familiar with trade conditons and the personnel of the company's directors and stockholders. A considerable amount of the company's product is bought by Canadians. The company controls the Electro Bleaching Gas Company and the Niagara Alkali Company, thus the three concerns are included. The Niagara Alkali Company was organized by German capitalists, no doubt, but it was taken over by Mr. Edwin D. Kingsley of New York City and who is a native of Connecticut. Not a dollar of German capital is now invested in this company. Furthermore, Drs. Neuhaus and Ornstein, who direct the processes of the plant, have taken out their first papers to become naturalized citizens. This is strictly an American company, yet England has placed the ban on this company. It is understood that the action of Great Britain in placing the company on the blacklist was actuated by the company's refusal, some months ago, to sell liquid chlorine to the Allies. The company is now rushed with orders and demand for its product by customers who would be steady. In fact, at the present time they are fairly overrun with orders by this more steady trade. Besides, as far as it can be learned, the company has not and is not supplying the Germans with any of its products. The matter is to be taken up with the State Department, as the company feels that the international law has been violated.

On July 22 the silver platers employed by the W. A. Rogers, Ltd., enjoyed their annual excursion to Crystal Beach. The company allowed full day's pay, together with transportation and $100 given as prizes. S. J. Moore, president of the company, and other officials of the plant were on hand.

Representatives of the International Nickel Company of New Jersey are visiting places near Niagara Falls, Ontario, with the object of establishing a branch plant in the Dominion.

Operations will be commenced in a few weeks at the new plant of the Canada Nickel Smelting & Refining Company at Chippewa. It will be the first nickel refining plant to use Niagara power, and will constitute the first step towards the proposition on hand by the government to use Niagara power for this process, as the government favors refining all of Ontario's nickel within the province, which will call for extensive uses of electrical power. The company will pay royalties for the use of the government processes. As it is generally understood, operations will not begin on a large scale until the government has completed its experimental work on two new electrical processes. The electrical method has been tested in the laboratory and found to be successful from a scientific viewpoint. It is now to be tried on a large scale to ascertain if they would be a success commercially.

G. W. G.

ROCHESTER, N. Y.

August 7, 1916.

Trade in this market is very good, and were it not for the extraordinary labor scarcity things would be running very much more smoothly. The demand for local wares is exceptional, but the difficulty is the getting of labor to do the work. This scarcity of labor applies to all of the local non-ferrous metal trades in the Flower City. Such a condition as prevails here has never been equalled in this city. Besides a shortage of labor, there also appears a shortage in drayage. However, in spite of all these difficulties, the local men believe that things will shortly turn for the better.

There is a slight slowing up amongst the foundries, but this is only believed to be a slight and temporry lull. The future trade is looked upon as very encouraging. The farm crops throughout the country are far in advance of those of previous years, and this, the local men believe, is one indication that the fall will bring forth more business. The farmers will have more money with which to buy new machinery, etc., and this in turn will stimulate the fall trade with the foundries.

The platers are equally as active as they were a month ago, and with no signs of a let up. They are enjoying one of the busiest periods in their entire history.

Mr. Sarachan of the Genesee Iron & Metal Company, who is known to all of the brass foundries in western New York, was recently killed in his automobile when his machine was struck by an express train.

G. W. G.

COLUMBUS, OHIO

August 7, 1916.

The metal market in central Ohio territory is ruling firm in every particular. The volume of business is holding up fairly well under the circumstances. Prices are rather steady at the levels which have maintained for sometime. The decline in price recorded a month ago still maintains but the weakness is not more apparent and in some instances recoveries are recorded. Metal using concerns are buying considerable, although they are only laying in supplies for the present. In fact the market appears to be in a waiting condition. The supply is now equal to the demand and there is no shortage in any variety of metal.

Some delay in shipments is caused by the car shortage, especially on western roads. On the whole, prospects for the future are fairly good and metal dealers believe there will be a good trade during the fall and early winter.

Copper is not very active, although prices have been well maintained. Ingot copper is quoted from 25½ to 26 cents to the trade. Brass is quiet with red brass quoted at 15¼ to 15½ cents and yellow brass ranging from 11 to 12 cents. Babbitt is in fair demand at unchanged quotations. Aluminum is fairly strong and is selling at 52 cents. Type metals are exceptionally strong in all localities. Both tin and zinc are quiet.—J. W. D.

CLEVELAND, OHIO

AUGUST 7, 1916.

Most significant in the month's developments in the metal industry of Cleveland is the large number of workers required for the different branches of the business. Demand for all metal products, instead of dropping off during the heated term, has increased this year, and the question now is that of unemployable rather than unemployed. To the credit of the trade as a whole, it must be said the employers are meeting the problem with equanimity, willing to pay more than a reasonable figure above the normal demanded, even for common labor. But, as always, advantage is taken of this condition.

A representative of an Akron industry, despairing of finding sufficient labor in the city thirty miles to the south, came to Cleveland the other day, and made a personal appeal to men in the Square here. He offered 30 cents an hour for common laborers. Fifty cents was demanded by one of the group, and he "would think it over" if offered that price.

Although the preparedness excitement has died down somewhat, now that the soldiers are either at Columbus, or on their way to the border, the metal and allied industries are really only beginning to feel the effects of this movement. Best example of this is seen in the big orders being placed here for barbed wire by the United States Government.

Speaking of war orders, the Peerless Motor Car Company has gone a step farther in meeting the demands of the United States Government. At its plant in the southeastern part of the city a big cinder path has been constructed, and upon this the men who will man the 1,500 trucks ordered for border service practice daily. Big tents, to house the men, give the tract the appearance of a circus allotment.

One of the largest individual lamp contracts let lately is that for the bronze lamp posts for the Brooklyn-Brighton Bridge, awarded to the Resiter-Thermacher Company. The contract price is $6,400. There will be forty-four posts in all.

With the increased demand upon all metal industry plants in this section has come extensive building operations, both among the established concerns and new enterprises. Anticipating the government's need for aeroplanes, a corporation for the manufacture of these machines has been organized by Dr. C. M. Wanzer, inventor of a new flying machine, and Charles P. Salen. Plans are being made for the erection of a plant for the manufacture of the machines.

A company of Detroit capitalists, which will manufacture automobile specialties, has started the construction of a brick building in the East End, with a view toward starting operating by fall.

The Dann Products Company, Chicago, another out-of-town organization, has selected Cleveland for a new manufacturing plant. A factory building to turn out the automobile accessory this firm makes, will be erected here soon. Cleveland, according to E. G. Dann, general manager of the company, who looked over the sites, is the best distributing center for this product. —C. C. C.

CINCINNATI, OHIO

AUGUST 7, 1916.

The terriffic heat which has prevailed all through the middle west recently has had a perceptible effect on the various branches of the metal trades, as well as on other lines, business slowing up materially on this account. The general situation, however, is excellent for the season, there being little difficulty in keeping busy. The demand for metal-working machinery, which has nearly always been the principal factor in the activity of the local metal market, is very good indeed, having shown a marked revival after a slight let-up. The foundries are all well booked with orders, while metal dealers report an improving demand for supplies, the lower tendency in prices having had a stimulating effect. Coppersmiths have not had as much to do of late as a few months back, when the flood of orders resulting from the work of converting whiskey distilleries into alcohol plants gave them the best business in years.

The big addition to the plant of the Edna Brass Works, on Reading Road, is making excellent progress, and will, when completed, give the company one of the most up-to-date plants of its sort in the city.

Jacob Buchert, vice president of the Ansonia Copper & Iron Works, of Cincinnati, visited Chicago recently for the purpose of closing several large copper contracts regarding which the company has been negotiating.

The increased price of aluminum within the past few months resulted recently in a suit by the Fidelity Metal Company, of New York, against the Enterprise Aluminum Company, of Massillon, O. The New York concern alleged in its suit that the Massillon company offered to sell 1,500 pounds of scrap aluminum at 38 cents a pound, and refused to make delivery later. Suit was filed for the difference between 38 and 52 cents a pound. The defendant alleges that its offer was not accepted within a reasonable time, asserting that two months elapsed before the Fidelity Company attempted to purchase the metal.—K. C. C.

DETROIT, MICH.

AUGUST 7, 1916.

The same conditions seem to prevail among the metal industries of Detroit and suburbs as reported within the last month. The plants are working to full capacity and notwithstanding the press of orders, some are contemplating a shut-down for a few days in order that they may take stock. This is particularly true among the automobile concerns where orders are piled up that will keep the majority busy indefinitely.

The Ford Motor Company is planning to close for a few days for this purpose, giving about 30,000 men a brief vacation. This plant is doing the greatest business in its history and still is adding to its buildings and equipment, its brass and aluminum plant being one of the largest in the country. The Studebaker Corporation here also is planning to spend about $1,000,000 for new buildings and equipment.

Manufacturers of plumbers supplies are reporting a good run of business. Some of these are still busy on munition contracts and will be kept busy until long into next year.

At a recent meeting of the directors of the Michigan Copper & Brass Company, a dividend of 5 per cent. cash was declared to owners of the company's common stock. Brokers who are interested in this company believe that this dividend inaugurates a plan for the payment of a monthly dividend. Less than a month ago this company authorized the payment of stock dividend of 125 per cent. This closely followed a dividend of 25 per cent. in cash.

The manufacture and sale of jewelry and optical goods is undergoing a wonderful growth in Detroit. Three firms here make a specialty of the manufacture of emblem and fraternity jewelry, and the increase in the business has placed the city at the top in this line. Another plant here has an output of 25,000 scarf pins made from gold and platinum. Within the last two or three years the manufacture of jewelry here has increased in great proportion and manufacturers expect to see a further advance in this line.—F. J. H.

R. G. Anderson, the general superintendent of the Master Carbureter Corporation whose plant is located on West Fort street, reports business far ahead of last year, and the plant has had to run day and night to keep up with orders.

The two leading brass manufacturing plants which manufacture valves, lubricators and injectors have taken up the manufacture of carbureters this year and are making it a success.

The Detroit Lubricator Company are manufacturing the Stewart carbureter and have a department exclusively set aside for same.

Penberthy Injector Company, Holden avenue, are working their factory overtime to keep up with their orders for carbureters,

also their general line of work, steam injectors.

The H. Mueller Manufacturing Company, Sarnia, Ont., have started work on their new office building which will consist of two stories brick with a cement foundation and basement.

The Perfection Stove Company of Sarnia, Ont., a branch from the Cleveland, Ohio, concern, are adding a new addition to their plant to take care of their increasing business; they are now manufacturing a full line of kerosene heating and cook stoves. —P. W. B.

LOUISVILLE, KY.

AUGUST 7, 1916.

While distillery work has slumped somewhat during the past month, and orders for big copper and brass work are not quite so plentiful as they were thirty days ago, most of the shops are continuing to be busy, and using about all the copper workers they can secure. There is an unusually good demand for small castings of one kind or another from manufacturers in various lines of business, and it has also been noticed that there is an unusually good demand for bearings of various sorts, showing that machinery is being put in good shape.

As a rule factories of all kinds are working to capacity, and prosperity is general. The demand for labor is far greater than the supply, and it is claimed that any able bodied man who wants to work can find more jobs than he can hold just now. Summing up conditions, it looks as though general business is going to be extremely good during the next few months, and copper workers should have a very good season this fall.

The condition of the material market is rather a puzzle to most of the metal workers of the Louisville district. While prices in a jobbing way have dropped down to where copper ingot may be purchased at from twenty-five to twenty-seven and one half cents a pound, it is claimed by several Louisville copper men that this price is merely due to speculation on the part of jobbers and buyers earlier in the year, and that mill and mine prices have shown no change. The speculators are said to have become afraid of existing conditions, and have unloaded, fearing a slump in the market. This condition is borne out by the fact that tube and sheet mills are holding at former prices. Local quotations are about as follows: sheet copper, 37½ Pittsburgh; 39½ Louisville; ingot, 27½ cents; tubes, base price, 41½ cents; scrap copper, 21 cents; brass scrap, 18 cents; light brass scrap, 14 cents. There has been a big demand for scrap material and the market is really well cleaned up.

F. H. Sparks, manager for the local jobbing house of the W. P. Davis Company, recently returned from a trip through the South. Mr. Sparks stated that business in the South was not what it had been in the East on his previous trip, but was good. Many of the large jobbers and users of copper and brass purchased heavily in January for July delivery, buying far in excess of actual needs with the result that in many cases jobbers are now in position to compete with the mills, and have enough stock on hand so that they do not have to worry about the market for some time to come.

There has been a change in the management of the Stege-Rindt Plating Company, a combination of the old houses of E. A. Stege & Company and Rindt Brothers, formerly the Art Brass & Plating Company. Carl and Louis Rindt recently sold their interests in the concern to the Stege brothers, who have filed amended articles of incorporation as the Stege Brass & Plating Company. The new officers are: E. Stege, president; Louis C. Stege, vice-president and general manager; George W. Stege, secretary-treasurer. The company is very busy just now with automobile plating work, radiator work, etc.

Louis Rindt, formerly connected with the Stege-Rindt Plating Company, it is reported, will probably establish a new brass and plating concern in the near future, although no definite arrangements have been made so far.

What promises to be a great aid to copper and other metal workers of Louisville is an effort which is being made by the Louisville Board of Trade to promote Louisville as a factory and industrial center. The Louisville Industrial Foundation, with authorized capital of $1,000,000, has been incorporated and over half of the capital stock already subscribed through a campaign of leading business men. The object of the organization will merely be to promote Louisville's interests as a manufacturing center.

The Chattanooga Brass & Machine Company, of Chattanooga, Tenn., recently filed articles of incorporation, with a capital of $15,000. The incorporators are: W. L. Case, Carl Flatter, John W. Fort, and W. F. Norman.—J. D. C.

TRENTON, N. J.

AUGUST 7, 1916.

Due to a cessation of war orders from European nations, the munitions departments of the Jordon L. Mott Company have been temporarily closed. Between three hundred and four hundred men and boys are affected by the closing of these departments. In fact all the munition workers at the Mott works have been laid off with the exception of the pressers. The latter will be continued until actual work begins on the second big war order. The second order, it is said, will not be so large as the first one and will be turned out much faster. The first order given to the Mott Company through the Bethlehem Steel Company called for 1,000,000 time fuses at a cost of $5,000,000. Work on the same was begun about a year ago and was turned out rapidly after the employees became familiar with the making of munitions. A new building had to be erected at big expense and the other departments so arranged that the munitions could be practically turned out in the same building. Special machinery and tools had to be made for the work. In the brass department all the lathes were arranged in one room and the machinery used in the manufacture of spigots and hardware supplies was removed and set up in other places. The first order had to be hurried and the company operated three shifts of eight hours each to keep the Bethlehem Steel Company supplied with fuses to place the finishing touches on. The second war order has been practically settled upon and the Mott company will begin work on the same in a short time. This order is only expected to last about three or four months. With the special machinery and the men familiar with the work, the new order can be turned out much faster than at the beginning of the old one.

The American Ammunition Company at Bordentown, N. J., is turning out shells and shrapnel for the Canadian government and is very busy. The company has completed a thirty-foot addition to its plant along the Delaware River, and will shortly commence turning out brass fuses for the American Government. It is said that the new contract will insure steady work for two or three years longer and more hands will eventually be required. The majority of the employees live in Trenton, commute with Bordentown by trolley. Both the American Ammunition Company and the fuse corporations in south Jersey are very busy at the present time.

The John A. Roebling's Sons Company has posted notices in its plant that the several thousand employees will be given a 5 per cent. bonus in addition to their wages for punctuality. This is done for the purpose of having the men make full time, the company being very busy in all departments. This bonus will also greatly benefit the employees working in the various metal departments.

William G. Wherry, of the Skillman Hardware Manufacturing Company, has returned from an extended business trip through the Southern States and reports everything very encouraging. He brought back with him a number of good-sized orders to keep his plant busy for some time. "Further than what business is on hand," he said, "I cannot forecast the future, but I believe business will continue good." The McFarland Foundry and Machine Company reports that business is pretty good at this time. The company does a big business in manufacturing bronze and aluminum castings for the majority of the Trenton, as well as out of town, plants.

The Ingersoll-Trenton Watch Company continues busy, and some of the orders are for watches for European nations. The Ingersoll watches now find a market in all parts of the world. The Trenton Brass and Machine Company, Trenton Smelting and Refining Company, Billingham Brass and Machine Company, Bechtel Engraving Company and the Clifford Novelty Works report business good.—C. A. L.

NEWARK, N. J.

AUGUST 7, 1916.

While in some lines there is a little decrease from the volume of business done in the winter, spring and early summer, business generally continues to be very good. With many of the manufacturers it is just about normal, as far as the volume is concerned. Of course, every manufacturer is harassed because of the difficulties of getting materials of the kind wanted, at the time he wants them, and at a reasonable price, and some materials are almost impossible to get. Transportation lines have also been so overworked that it has been a very difficult thing to promise shipments. Some of these adverse conditions have improved a little of late and the manufacturers have adjusted themselves to changed conditions so that with the orders continually coming in, in many cases at advanced prices which cover the increased cost of the raw materials, they are doing real well. Each passing month sees things on a more normal basis.

When business began to improve last fall it was spotty, and there was much uncertainty and lack of confidence. There is still a little spirit of caution shown, but it is a sane caution and not one which holds manufacturers back from taking steps which seem advisable. Last year many would not branch out where it seemed good policy to do so, because of the feeling that the better business was only temporary. How this reasonable caution is now working out is shown by the attitude of many manufacturers of various kinds of metal goods who are looking for a fine fall business. These men are expecting good business and planning for it, but in their planning they are not going ahead wildly, as is sometimes the case when times have been unusually good for a long period and no though is taken of the possibility of dull times. They are conservatively active in their preparation for the fall business, and so plan that in case the war stops and there is another time of greatly unsettled business, they will have their business under control and not suffer heavy losses. In other words, they have learned something by their experiences of the past two years. While most of what might be termed legitimate, or regular lines are about normal, and a few concerns somewhat above normal, some of the manufacturers of war munitions have had a little slackening of their work during the past month—not by any means a slump, but a lessening of the high pressure at which they have been going for the past year and a half or more.

One of the features of the local metal market of the past month is the fact that platinum, which soared so high the early part of the year, has begun to come down. There is practically no platinum coming in from Europe, but there is some coming from South America, and this is in slightly larger quantities than heretofore. The scarcity of the metal during the past months, and the consequent high price, has brought out from all sorts of places scrap metal, and while these scraps often come in driblets, the aggregate has been considerable.

Rollers of silver are not doing quite so much as they were a couple of months ago. While manufacturing silversmiths are busy, and they are selling a considerable quantity of goods at prices higher than several months ago before silver began to go up, there has been a little decrease in the demand, and some houses which made a considerable advance in the prices of their products are beginning to come down again. The metal factories which closed the early part of July for the semi-annual overhauling of machinery, engines, etc., repairs and alterations, are now working again. A number of other factories closed down during the first week or two in August for the same reason. The labor problem continues to bother many manufacturers. —R. B. M.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The International Silver Company, Meriden, Conn., is constructing a small one-story brick addition, 38 x 51 feet, to its rolling mill.

The Indiana Die Casting Company, Indianapolis, Ind., will build an addition to its plant and die casting machinery will be purchased. The company operates a tool room and casting shop.

The Fort Smith Spelter Company, Warren, Ohio, announce through E. F. Clark, secretary and treasurer, that they are in a position to supply consumers with brass special and prime western spelter.

The F. B. Shuster Company, New Haven, Conn., manufacturer of riveting machines, sprue cutters, etc., is erecting an addition to its present building to be used for storage and shipping departments.

The Progressive Brass Manufacturing Company, manufacturer of brass, copper, bronze and aluminum castings, Kansas City, Mo., is building a brass foundry, 50 x 100 feet at 106-108 Southwest Boulevard.

The Texas Plating & Wire Works, Beaumont, Texas, electroplaters and manufacturers of wire, iron and brass goods, have purchased all necessary equipment and supplies for plating and manufacturing wire devices.

The Michigan Copper & Brass Company, Detroit, Mich., has increased its capital stock from $800,000 to $1,200,000, necessitated by the payment of 125 per cent. stock dividend, declared June 9, 1916, and payable on stock of record on that date.

A one-story stone building 24 x 70 feet will be constructed by William Bartley & Sons, Bartley, N. J., to replace the two-story building which was recently destroyed by fire. A foundry and casting shop are conducted by the Bartley Company.

The Enterprise Brass Works, Muskegon Heights, Mich., has let the contract for the construction of a three-story 50 x 150 foot addition to its factory at a cost of $35,000. The company expects the addition to be completed by October 15, 1916.

The Manhattan Brass Company, 322 East 28th street, New York, N. Y., has awarded the contract for an addition to its plant. The company operates the following departments: Rolling mill, cutting-up shop, stamping, tinning, soldering, polishing, lacquering and plating.

The Robert Rom Manufacturing Company, 1023 St. Paul avenue, Milwaukee, Wis., advise that the published report that they will construct a new factory on 63rd avenue and Burnham street, West Allis, Wis., for the manufacture of plumbing supplies is not correct.

Plans are being prepared for the construction of an addition to the factory of the U. S. Electro Galvanizing Company, 1 Park avenue, Brooklyn N. Y. to be used for the manufacture of plating and galvanizing machinery. The estimated cost of the addition is $8,500.

Seldner & Enequist, Brooklyn, N. Y., announce that they are making a specialty of purchasing the sediment that separates out of brass and copper acid dipping solutions. They request those having sediment of this kind to dispose of to send samples and they will submit offers.

The Hanson & Van Winkle Company, manufacturer of electroplating materials, Newark, N. J., is building a four-story brick addition, 45 x 49 feet, to increase the capacity of its department for the manufacture of polishing compositions. It will also install a number of labor-saving devices in the department.

The second addition to the foundry of the Newark Stamping & Foundry Company, Newark, O., was recently completed. This new addition was made necessary by the consolidation of the business of the Newark Stamping & Foundry Company with that of the Moser Pattern Company. The company operates an aluminum foundry, spinning, stamping, plating, polishing and lacquering departments.

The Lumen Bearing Company, Buffalo, N. Y., on July 14, started its new electric furnace for the manufacture of Lumen metal. The company has increased its pattern storage vault 50 per cent. and erected a garage for its motor trucks. In

September the molding capacity of the company will be increased 33⅓ per cent.

The Geuder, Paeschke & Frey Company, Sixteenth and Canal streets, Milwaukee, Wis., maker of steel and sheet-metal stampings and specialties, is building an addition, 55 by 130 feet, to its plant. The company operates a tool and grinding room, spinning, stamping, tinning, soldering and japanning departments.

The Stratford Brass Company, Stratford, Ont., Canada, manufacturer of brass fixtures, is building an addition to its plant 42 x 42 feet, two stories. The company operates a brass foundry, brass machine shop, tool room, grinding room, casting shop, spinning, stamping, plating, polishing and lacquering departments.

A six-story, 75 x 800 foot, addition is to be built by the Sprague Electric Works of the General Electric Company, Bloomfield, N. J., manufacturer of motors and generators. In connection with the manufacture of its product the company operates a tool room, grinding room, galvanizing, stamping, soldering, plating, japanning and lacquering departments.

The Department of Commerce, Bureau of Standards, Washington, D. C., announces that there will be an examination on August 23 under United States Civil Service to fill the position of assistant physicist, qualified in physical metallurgy. For information relating to this position apply to the United States Civil Service Commission, Washington, D. C.

The Peerless Tube Company, manufacturer of collapsible tubes, which recently moved its plant from New York City to Bloomfield, N. J., has dissolved its corporation in the State of New York and has incorporated in New Jersey. It will still retain its office at 253 Broadway, New York. The company operates a tool room, grinding room, rolling mill, stamping and lacquering departments.

The T. McAvity & Sons, St. John, N. B., Canada, is erecting a plant to be used for the manufacture of eight-inch British shells. After the war the company expects to convert the new plant into a brass and iron foundry and machine shop, and will operate the following departments: Brass machine shop, tool and grinding room, casting shop, plating, polishing and lacquering.

The McGill Metal Company, Valparaiso, Ind., manufacturer of alloy metal for disk shapes, has leased part of the plant of the Kokomo Nut Company, Kokomo, Ind., and will install machines for forging brass, McGill metal and steel. McGill metal, it is said, is a die cast aluminum bronze having a tensile strength of 75,000 pounds and is cast in steel dies in much the same manner as is white metal.

Brown's Copper & Brass Rolling Mills, Ltd., Lake Shore Road, Mimico, Ont., is increasing its sheet rolling capacity by the addition of six new mills and is also erecting a new building for machine shop and concentrating plants, all at a total cost of about $160,000. The new extrusion rod mill, which has been under construction during the past six months, will be ready for operation about August 15, 1916.

The Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., will construct a two-story machine shop and will shortly be operating a brass, bronze and aluminum foundry, pattern shop, die casting department and machine shop. The company has also recently added to its bronze department sales force Gilbert T. Mason, formerly secretary and treasurer of the Atkinson Company, Rochester, N. Y., as it has found it necessary to increase its organization to properly take care of its growing trade which is expanding very rapidly.

The Gehnrich Indirect Heat Oven Company, Inc., 60 Franklin avenue, Brooklyn, N. Y., announce that owing to the steadily increasing demand for Gehnrich indirect heat radiator type ovens, which are used for all kinds of japanning, lacquering and drying purposes, etc., the company finds its present plant and factory facilities inadequate to take care of their orders, and the board of directors has therefore voted to purchase a plot of ground 100 feet by 200 feet, in Long Island City, N. Y., on which to erect a three-story factory building. Plans are now being prepared by the architects, and construction work will begin soon. It is only about three years since the company built and moved into its present plant, and the fact that they have already outgrown it testifies to the remarkable success of their ovens.

The Munning-Loeb Company, whose main works and office are at Matawan, N. J., and who manufacture in large quantities the materials used in the metal finishing trade, such as anodes, buffs, electrolytic motor generator sets, generators, chemicals, etc., have found it necessary in order to take care of their increasing business in the West to open up a warehouse and Western branch in Chicago, Ill. This branch will be located at 9 South Clinton street, in the Madison Terminal Building, Chicago, Ill. It will be in charge of Mr. F. T. Taylor, who for the past nine years was Boston District Office Manager of the Cutler-Hammer Manufacturing Company. Assisting Mr. Taylor in the management of this Western branch will be Mr. E. Lamoureux, who for the past five years has been so successful as the Western representative of the Munning-Loeb Company. Both of these gentlemen will now be enabled to serve their customers to much better advantage due to the large and comprehensive stock which will be carried by them at Chicago. They will be very glad indeed to take care of any inquiries and assist in any matters which will make for the good of their customers and the trade in general, and invite anyone to make use of any facilities which they can offer.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture brass.—Oil City Brass Works, Beaumont, Texas. Capital, $5,000. Incorporators: George E. Bryant, C. J. Ficken and F. L. Pivoto.

To manufacture jewelry.—Kiefer Smith, Inc., Newark, N. J. Capital, $25,000. Incorporators: Andrew O. Kiefer, Thomas A. Smith and M. C. Kiefer, Newark.

To manufacture metal devices of all kinds.—John Strack Company, Newark, N. J. Capital, $5,000. Incorporators: John Strack, Andrew J. Patton, and George Ohl.

To manufacture metals and alloys.—Silvel Metal Manufacturing Company, New York, N. Y. Capital, $120,000. Incorporators: Morris L. Jacobs, William H. Davis, and E. E. Scovill.

To manufacture jewelry.—The Ionic Emblem Company, Rochester, N. Y. Capital, $25,000. Incorporators: William B. Remington, W. S. Robertson and Thomas J. Hargrave.

To do plate and sheet metal work.—Leslie & Elliott Company, Paterson. Capital, $125,000. Incorporators: David Leslie, William Elliott and W. Harry Smith, Paterson.

To deal in iron, brass and other metals.—Barnes Foundry Company, Jersey City, N. J. Capital, $25,000. Incorporators: Edward D. Bolton, Thomas B. Moran, John E. Donohue, New York.

To manufacture copper, brass, steel and manganese products.—Dee Allen Steel Corporation, New York, N. Y. Capital, $100,000. Directors: Dee Allen, Frank J. Benkart, and M. V. Bradshaw.

To do metal stamping.—The Acme Stamping Company, Cleveland, Ohio. Capital, $10,000. Incorporators: W. A. Neff, Jerome Z. Bayliss, Charles Raus, Harvey O. Yoder, and G. E. Sweet.

To manufacture chemicals and metals.—American Chemicals and Metals Company, Newark, N. J. Capital, $100,000. Incorporators: Martin W. Hillmyer, Ralph W. Pope and Benjamin F. Jones.

To manufacture and deal in metals.—The Western Metals Company, Cleveland, Ohio. Capital, $10,000. Incorporators: Valentine Glueck, Louis Heller, Frederick Lowber, Helen R. Skeels, Ray Franz and Peter Heller.

To deal in iron, steel and bronze goods.—Charles A. Nanz, Inc., South Orange, N. J. Capital, $25,000. Incorporators: Charles M. Peabody, Gertrude Elsmore, South Orange, N. J.; Henry Stetson, Orange, N. J.

To conduct iron and brass foundry.—Cunningham Foundry Corporation, Boonton, N. J. Capital, $15,000. Incorporators: Samuel W. Round, George W. Redfern, Jersey City, N. J.; James S. Cunningham, Boonton, N. J.

To manufacture silicon, aluminum, bronze and metal goods.—The Komfort Company, New York, N. Y. Capital, $10,000. Incorporators: Jesse C. Skinner, New York, N. Y.; Henry A. Gartner and William J. Lewis, Brooklyn, N. Y.

To operate mills for refining, smelting and preparing brass.—Cleveland Brass and Copper Mills Company, Cleveland, Ohio. Capital, $2,000,000. Incorporators: Herbert E. Latter, Norman P. Coffin, and Clement M. Egner.

To manufacture brass rods, extruded shapes and seamless tubes.—The Philadelphia Brass Company, 917 Crozier Building, Philadelphia, Pa. Capital, $101,000. President, Henry T. Coates, Jr.; secretary and treasurer, William E. Chickering, and general sales manager, Walter S. Johnston. Board of Directors: C. C. Anthony, Lewis Burnham, Henry T. Coates, Jr., J. Lloyd Coates, Carl B. Ely, E. B. McCarthy and Walter S. Johnston. The company has purchased a seventeen-acre tract at Downington, Pa., on which a plant will be erected.

FOREIGN TRADE OPPORTUNITIES

For addresses of these inquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file numbers.

Copper, Lead and Zinc, Etc., No. 21529.—A firm in Switzerland writes the Bureau that it wishes to receive quotations from American exporters of lead in ingots, tubes and rolled lead; copper in ingots, bars and plates; pig iron; zinc in ingots and plates; tin and terne-plates; galvanized sheets, leaded sheets and black sheets, and tubes.

Plated Jewelry, No. 21859.—An American consular officer in Central America reports that a man in his district desires to be placed in touch with American manufacturers of plated jewelry of all kinds, imitation stones, etc. Cash will be paid.

Salts for Nickeling, Etc., No. 21868.—An American consular officer in Switzerland writes that a firm in his district desires to be placed in touch with American manufacturers and exporters of the salts for nickeling or coppering for use of galvanoplastic baths. Correspondence in English.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages) will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Metal Machinery.—Bolt pointing, threading and special tapping machines are attractively illustrated and described in the new catalog issued by the Webster & Perks Tool Company, Springfield, Ohio.

Heat Regulators.—The Taylor Instrument Company of Rochester, N. Y., has issued a very valuable little folder in which they illustrate and describe the operation of the Tycos regulators, thermometers and pyrometers used on nickel plating baths and potash kettles.

Foundry Equipment.—The Whiting Foundry Equipment Company, of Harvey, Ill., has issued three new catalogs illustrating and describing the very extensive line of foundry equipment manufactured by this company. These catalogs are classified as follows: Tumblers and Dust Arresters, No. 120; Core Oven Equipment, No. 121, and Ladles, No. 122. Copies may be had upon request.

Foundry Exhibition.—The Exhibition Committee of the American Foundrymen's Association, whose convention and exhibit of foundry supplies and equipment will be held in Cleveland, Ohio, September 11 to 16, has issued a very attractive hanger calendar on which September, the month of the convention, is strongly featured in order to keep the date in the minds of all concerned.

Copperweld.—The Page Woven Wire Fence Company of Monessen, Pa., have issued a folder describing their new product Copperweld wire. This wire is a wire having an absolute weld between copper and steel weld voids. The company stated that they are meeting with splendid success in the sale of this wire and have sold a great deal to the various railroads and to manufacturing concerns for mechanical as well as for electrical uses.

Gas Consumption.—The latest booklet of the Tirrill Gas Machine Lighting Company, manufacturers of the famous Tirrill "Equalizing" gas machines, high efficiency gas burners and gas appliances of every description for every conceivable purpose, is just off the press, and will be mailed free to any one, addressing the company at their New York office, 103 Park avenue, New York.

Modern Hospital.—The August number of "The Modern Hospital," a magazine published in St. Louis, Mo., and Chicago, Ill., is devoted to a symposium on welfare work among the industrial corporations of the country. There are editorials by those competent to write on this important subject, a great number of papers written by welfare directors in some of the most important industrial corporations, and an immense amount of statistics and figures and facts showing the huge volume of work that the corporations are doing in the interest of the welfare of their employees.

Platers' Supplies.—Catalog No. 7 of Plating and Polishing Supplies and Complete Equipment has been issued by the Crown Rheostat & Supply Company, Chicago, Ill. This catalog consists of sixty-four pages with index and gives a list of practically everything used in the finishing of metals for all purposes and also illustrates several new devices for the economic production of work. There is also included in the catalog a good deal of valuable information relating to the plating and polishing trades. They also issued in connection with the catalog a booklet which gives a list of the chemicals used in the electro deposition and coloring of metals and the various names under which they are known and was compiled by H. E. Willmore.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REPORT

NEW YORK, August 1, 1916, corrected to August 7.

COPPER.

The month of July was again a waiting month as far as copper was concerned. Prices declined fully 2 cents per pound from the opening to about the 17th or 18th of the month, when prompt or July electrolytic sold at 24¾ cents against 26¾ at the opening, and last quarter was sold at 22 cents against 24 cents early in July. When spelter began to advance in London about the middle of July the cheap sellers of copper began to be wary as a demand for spelter would naturally mean a demand for copper, the result was that standard copper in London advanced about £10 in the last two weeks of July, while the price of electrolytic in London advanced only £2 per ton.

Some of the large producers came out as sellers at around 25 cents per pound for last quarter, and some fair business was done with consumers, and also a lot of copper has been bought by dealers and operators, and this copper will come out on the market again at the advanced prices on any sign of a reaction or a dull market. Already the spelter boom is about over, and prices are about 2 cents per pound below the highest, but copper at the end of July holds fairly firm. Holders of August copper are trying to squeeze belated buyers, and are asking a premium of about 2 cents per pound over the price of the later months, but there is not much August copper needed, and there is more than enough of the red metal to go around. The larger producers got tired of holding the umbrella and broke into the market as sellers at 25 cents to catch what orders they could get at around this price rather than let the stocks of copper pile up on them. This "selling movement" on the part of some of the large producers puts a very different appearance on the copper situation. We have all been told during the past few weeks that the large consumers would have to come into the market and beg the producers for copper, and that probably meant 29 cent copper again; instead of that the producers had to come into the market and take what they could get for it, which seems to have been about 25 cents per pound, and if the truth were known they were probably mighty glad to get even 25 cents. Four cents a pound is quite an item to most consumers, but to the producers 4 cents a pound, more or less, is a very small matter after the abnormally inflated prices of the past year in copper. We congratulate consumers on their "staying powers"; it has brought on a "selling movement," which is much more interesting from a consumer's point of view than a "buying movement," when hat in hand they have to go to the "captain's" office and beg for copper.

The exports are showing up better, but even then they do not come up to the amounts reported sold earlier in the year. In July the exports were 35,048 tons, against 39,595 tons in June.

The prices at the end of July for electrolytic were prompt, and August 26¾ asked, September 26 cents; October, November, 25½; last quarter, 24½ to 25 cents. Lake prompt, 25½ to 26 cents; casting, 24¼ to 24½ cents.

TIN.

The price of tin has declined about 1 cent per pound during the month from 39⅝ cents at the opening to 38½ at the close. The demand has been pretty good, and there seems to be plenty of tin in sight for future needs.

LEAD.

The trust price started at 7 cents per pound New York basis, but this price did not hold, and prices were lowered to 6½ cents. Today the independents are selling at 6¼, and the trust is likely to meet this cut pretty soon. August 3 the trust reduced the price of lead to 6 cents, N. Y.

SPELTER.

The spelter market has had quite a little boom, but it seems to be all over now, and prices are about 1 cent below the highest. The advance started in London, and prices there went up about £12 per ton. There was really nothing to it, but it was quite interesting while it lasted. Prices here went up about 2 cents per pound, and have come down about 1 cent, and market looks like the other cent is going to be lost before very long.

ANTIMONY.

Prices declined about 4 cents per pound during July from 17 cents at the opening to 13 cents at the close. The demand has been poor, and the heavy offerings from China and Japan were too much for the market.

ALUMINUM.

The aluminum market has held very steady at around 60 cents for Virgin, and 58 cents for the pure remelt. At the close there are some lower offerings, and the market has an easier appearance.

SILVER.

The silver market has been fairly active, with a fluctuation of 5 cents an ounce. Opening at 65 cents, prices declined to 60 cents, the low point for the month, and closed at 64⅛ cents.

QUICKSILVER.

The price of quicksilver opened at $80 per flask, and later was advanced to $83, but the demand was not good, and price was put back to $80. This price is close to the importation cost, and the indications are lower prices may be made.

PLATINUM.

The platinum market is dull and easier. The jewelry trade is dull and most of that platinum is used in ads. Prices have declined from $75 at the opening to a nominal quotation of $60 at the close.

SHEET METALS.

The same old story prompt and August copper wire is quoted at 31 cents, the "mills are so busy" down to 29¾ for October; these same mills can buy all the electrolytic copper they want at 26 cents, and at 1¼ cents conversion charge they can pay all their expenses and make good money. Sheets seem to be in the same state of artificial inflation. Sheet copper is still quoted at 37½ cents base. Base robbery is what it ought to be called, and the Waterbury average for Lake copper for the month is 27¼ cents; that's all the mills had to pay for their Lake copper, and they still quote 37½ cents for sheets. What would you call it? High sheet brass same story, 38 cents base—same base as the sheet copper, probably the same crowd. These prices are of course entirely nominal—if you know what that means. August 3, the price of sheet copper was reduced 2 cents to 35½.

OLD METALS.

The old metal market brightened up when copper and spelter began to advance; some dealers bought when they ought to have sold, and some did something else, and they never seem pleased for very long together. There has been some good export business in brass scrap.—J. J. A.

WATERBURY AVERAGE

The average prices of Lake Copper and Brass Mill Spelter per pound as determined monthly at Waterbury, Conn.:

Lake Copper. 1915—Average for year, 18.94. 1916—January, 24.75. February, 27.75. March, 28. April, 29. May, 29⅞. June, 28.25. July, 27.25

Brass Mill Spelter. 1915—Average for year, 17.50. 1916—January, 22.25. February, 22.75. March, 23.15. April, 23.20. May, 21.20. June, 17.40. July, 15.20.

JULY MOVEMENTS IN METALS

	Highest.	Lowest.	Closing.
COPPER.			
Lake	26.75	25.00	26.00
Electrolytic	26.75	24.60	26.75
Casting	24.50	22.30	24.50
TIN	39.40	37.60	38.50
LEAD	7.00	6.50	6.50
SPELTER	11.20	8.90	9.25
ANTIMONY (Chinese and Jap)	17.00	13.00	13.00
SILVER	65.00	60.00	64⅛

DAILY METAL PRICES

By an arrangement with the daily metal papers, The Metal Industry can furnish daily metal prices, and we offer a special combination subscription price of $10 per year for this service. The price of the daily paper alone is $10 and of The Metal Industry alone $1.00—combination offer $10.

Metal Prices, August 7, 1916

NEW METALS.	Price per lb. Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER. Manufactured 5 per centum.	
Lake, carload lots, nominal	26.00
Electrolytic, carload lots	26.75
Casting, carload lots	25.50
TIN—Duty Free.	
Straits of Malacca, carload lots	38.25
LEAD—Duty Pig, Bars and Old 25%; pipe and sheets 20%. Pig lead, carload lots	6.00
SPELTER—Duty 15%.	
Brass Special	11.25
Prime Western, carload lots, nominal	9.25
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½ per lb.	
Small lots, f. o. b. factory	67.00
100-lb. lots, f. o. b. factory	63.00
Ton lots, f. o. b. factory	60.00
ANTIMONY—Duty 10%.	
Cookson's cask lots, nominal	.....
Hallett's cask lots, nominal	.....
American	13.00
Chinese, Japanese	13.00
Wah Chang WCC. brand spot	13.00
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad valorem.	
Shot, Placquettes, Ingots, Blocks	45.00
ELECTROLYTIC—5 cents per pound extra.	
MANGANESE METAL	nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	6.00
BISMUTH—Duty free	5.00
CADMIUM—Duty free	nominal 1.90
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	2.00
QUICKSILVER—Duty, 10% per flask of 75 pounds	78.00
GOLD—Duty free	$20.67
PLATINUM—Duty free	$60.00
SILVER—Government assay—Duty free	.63⅜

INGOT METALS.	Price per lb. Cents.
Silicon Copper, 10%.....according to quantity	37 to 40
Silicon Copper, 20%..... " "	38 to 41
Silicon Copper, 30% guaranteed " "	39 to 42
Phosphor Copper, guranteed 15% " "	35 to 40
Phosphor Copper, guaranteed 10% " "	34 to 39
Manganese Copper, 30%, 2% Iron " "	48 to 53
Phosphor Tin, guaranteed 5% " "	55 to 60
Phosphor Tin, no guarantee.. " "	45 to 47
Brass Ingot, Yellow..... " "	16 to 18
Brass Ingot, Red..... " "	20 to 22
Bronze Ingot ..... " "	20 to 22
Parsons Manganese Bronze Ingots " "	29½ to 31
Manganese Bronze Castings.... " "	30 to 35
Manganese Bronze Ingots..... " "	23 to 27
Phosphor Bronze ..... " "	24 to 26
Casting Aluminum Alloys... " "	50 to 51

PHOSPHORUS—Duty free. According to quantity	35 to 40

Dealers' Buying Prices. Cents per lb.	OLD METALS.	Dealers' Selling Prices. Cents per lb.
22.00 to 23.00	Heavy Cut Copper	25.00 to 26.00
21.00 to 22.00	Copper Wire	24.00 to 25.00
18.00 to 19.00	Light Copper	21.00 to 22.00
17.00 to 17.50	Heavy Mach. Comp.	18.50 to 19.00
13.50 to 14.00	Heavy Brass	16.00 to 16.50
11.00 to 12.00	Light Brass	13.00 to 13.50
14.00 to 15.00	No. 1 Yellow Brass Turnings	15.50 to 16.00
14.00 to 15.00	No. 1 Comp. Turnings	16.00 to 17.00
6.50 to	Heavy Lead	.... to 7.00
12.00 to 13.00	Zinc Scrap	14.00 to 15.00
18.00 to 23.00	Scrap Aluminum Turnings	20.00 to 25.00
30.00 to 35.00	Scrap Aluminum, cast alloyed	35.00 to 40.00
35.00 to 40.00	Scrap Aluminum, sheet (new)	45.00 to 50.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 24.00	Old Nickel	20.00 to 24.00
20.00 to 24.00	Old Nickel anodes	20.00 to 25.00

PRICES OF SHEET COPPER.

Mill shipments (hot rolled) ..... 35½c. base net.
From stock ..... 37c. base net.

SIZE OF SHEETS. Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Not longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC—Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill..15.00 cent basis, less 8%	
Casks, jobbers' prices	16
Open casks, jobbers' prices	16½

Metal Prices, August 7, 1916

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect May 10, 1916.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.40	$0.41	$0.42
Wire	.40	.41	.42
Rod	.40	.42	.43
Brazed tubing	.45	—	.47
Open seam tubing	.45	—	.47
Angles and channels	.45	—	.47

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.42	$0.43	$0.44
Wire	.42	.43	.44
Rod	.42	.44	.45
Brazed tubing	.47	—	.49
Open seam tubing	.47	—	.49
Angles and channels	.47	—	.49

[Note.—Net extras for quality for both sections of above metal prices are not quoted due to the fluctuations in the price of zinc.—Ed.]

BARE COPPER WIRE—CARLOAD LOTS.

30½c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	38c.	per lb. base
100 lbs. to 300 lbs. in one order	37½c.	" " "
Less than 100 lbs. in one order	40c.	" " "

PRICES FOR SEAMLESS BRASS AND COPPER TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, — per lb.
Seamless Copper Tubing, — per lb.

For other sizes see Manufacturers' List.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛ ¼ ⅜ ½ ¾ 1 1¼ 1½ 2 2½ 3 3½ 4 4½ 5 6

Due to fluctuations of the metal market we are unable to quote these prices.

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch		
½ inch		
⅝ inch		
¾ inch		
⅞ inch		
1 inch		
1¼ inch		
1½ inch		
1½ inch		
1¾ inch		
2 inch		

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod	42c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	38c.	" "
Muntz or Yellow Metal Rectangular sheets other than sheathing	41c.	" "
Muntz or Yellow Metal Rod	39½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 58c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 7c. over Pig Tin. 50 to 100 lbs. 8c. over, 25 to 50 lbs. 9c. over, less than 25 lbs. 15c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Base price, 60c.

Gauge.	Width. Inches.	1 ton.	50 to 2,000 lbs.	Less than 50 lbs.
20 and heavier	3-30			
	3-30			
21 to 24 inclusive	30-48			
	48-60			
25 to 26	3-30			
	30-48			
27	3-30			
	30-48			
28	3-30			
	30-48			
29	3-30			
	30-48			
30	3-30			

We are unable to quote these prices, but they can be had upon application to manufacturers and dealers.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.

Outside Diameters.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ in.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.																	
12.	.109.																	
14.	.083.																	
16.	.065.																	
18.	.049.																	
20.	.035.																	
21.	.032.																	
22.	.028.																	
24.	.022.																	

We are unable to quote these prices, but they can be had on application to manufacturers and dealers.

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

We are unable to quote these prices.

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	44c.	16%	48c.
8%	45½c.	18%	48½c.
10%	46c.	20%	51c.
12%	47c.	25%	60c.
15%	47½c.	30%	66c.

GERMAN SILVER WIRE.

Quality	Net per lb.	Quality.	Net per lb.
5%	47c.	15%	53¾c
8%	49c.	16%	54¼c.
10%	50½c.	18%	56¼c.
12%	52¼c.	30%	71½c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.